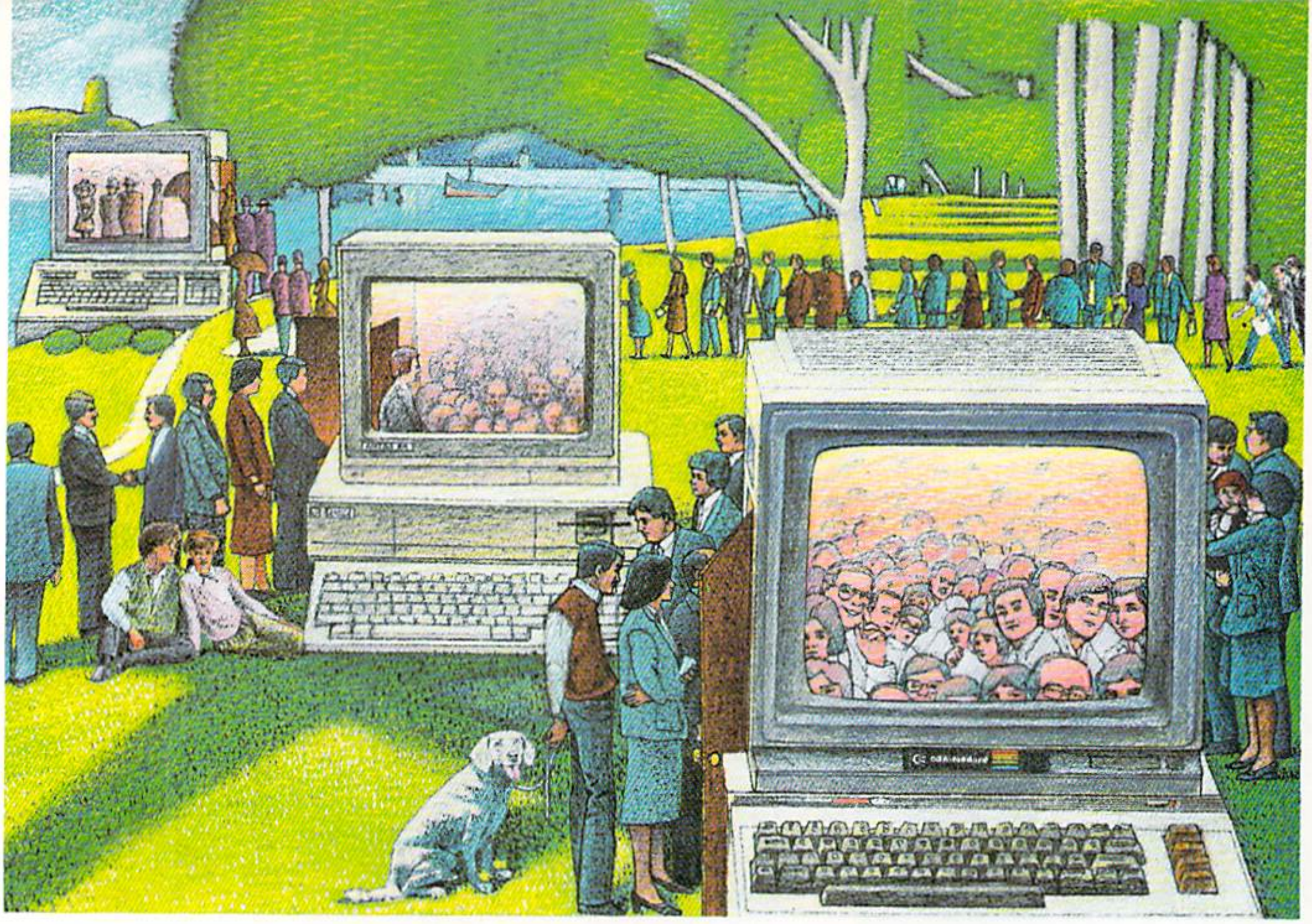
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Ahoy!

OCTOBER 1987





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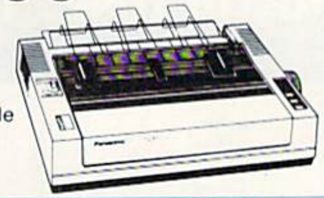
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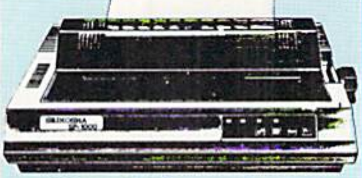


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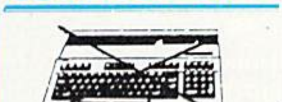
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VIEW FROM THE BRIDGE

However unintentionally, the roster of names on the *Ahoy!* contents page is a little deceiving. Some of those listed divide their time between *Ahoy!* and other magazines published by this company; some are freelancers who work at home. As far as editors in particular are concerned, we identify no fewer than ten individuals as one sort of editor or another, but those who do the job on a daily basis number only three: Michael R. Davila, Tim Little, and the undersigned. That is, until this week, when Senior Editor Tim Little accepted a lucrative offer to join Electronic Arts' programming department.

We hate to see Tim go, but are grateful for his nearly two years of dedicated service. We're sure the many of you Tim has assisted on the *Ahoy!* hotline and through the mail will echo those words. Our loss is EA's gain. There's not an ounce of resentment behind these tears in our eyes—only pride!

Now let's get on to something really important—the October issue of *Ahoy!*

• Cleve Blakemore probably didn't say, "I'm going to create a cult classic" when he sat down to program *Vault of Terror* and *Dark Fortress*—but that's the way it turned out. To this day, we receive more mail on those two games than on most new ones published in any given month. We don't think this will be one of those months, however—because Cleve has gone to the gold mine one more time! You may never play "Monopoly" again after getting caught up in the mercantile madness of *Empire.* Money *can* make people crazy, you know—crazy enough to turn their backs on their colleagues when a better offer comes along. (Turn to page 47.)

• Though he's not the type of guy to use *Ahoy!* as a platform to bigger and better things, Tony Brantner contributes *Platforms* this month. We no longer feel the need to boast about Tony's graphics—go and see for yourself! (Turn to page 16.)

• John Krutch gives you a *Hotfoot* as you traverse a constantly changing grid of squares ranging in temperature from soothing to sizzling. Those of you who have been burned, as we have, can surely relate. (Turn to page 38.)

• It's worthy of note that while Dale Rupert could have stabbed us in the back years ago and gone over to *Byte* or somewhere, he's still with us, contributing his 46th *Rupert Report* to this, the 46th issue of *Ahoy!* His explanation of arrays and linked lists is like the pot of gold at the end of *A Rainbow of Data Structures.* (Turn to page 20.)

• We love welcoming new people to these pages—especially since you never know when someone you depend on will leave you flat. Anthony Bertram breaks in in a big way with *C-64 RAMDrive,* which simulates a RAM disk and lets the user try some of its features. (Turn to page 36.)

• Ever been in a jam? We sure are, with work piling up around here and not enough editors to handle it. But Buck Childress' *Jam Attack* defends you from a different type of jam—the one that results from trying to save a program that's too large for the disk space available. (Turn to page 34.)

• Remember the days when the Protestant work ethic still held sway—when the opportunity to do a good job for a company that took care of you meant more than a big raise you could get by jumping ship? Bob Blackmer gives us a little taste of what those days were like in *Spray-Cam,* where you labor to repair the exhaust tanks in an industrial complex. (Turn to page 18.)

• Rarely does a review rate specific mention on this page, but Morton Kevelson's extensive evaluation of BASIC 8.0 is a true "first." Naturally, when Morton procured an advance copy, he offered the review to us—not some other magazine that outbid us. (Turn to page 63.)

You'll find much more inside than we can go into here. We'd rather use the space remaining to serve notice that we are, in all seriousness, looking to fill the vacant editorial position here at *Ahoy!* If you live within commuting distance of Manhattan (if you have to ask, "where's Manhattan?", forget it) and possess Commodore expertise and language skills, you're our boy (or girl). Call us or send a resume.

And to Tim Little, who we're certain is stretched out in San Mateo with his suntan lotion in one hand and his joystick in the other: onward and upward! Things will never be the same around here. Little does Electronic Arts suspect that the same is soon to be true for them! *—David Allikas*

SCUTTLEBUTT

MODULA CONSTRUCTION SET • SPEECH DIAGNOSIS PROGRAM • BANK STREET FILER DATABASES • SOFTWARE SEARCH • ART PROGRAM • DEBUGGER • GEOS JOYSTICK • GAMES FROM ACCESS, FIREBIRD, INFOCOM, ACCOLADE • BOOKS • AMIGA ACCOUNTING • TV GRAPHICS

MOUSE SUBSTITUTE

Specifically designed for use with GEOS in place of a mouse, the IconTroller ($19.99) mounts directly on the C-64 or 128 keyboard surface via semi-permanent tape. A feed-through jack permits the use of a gaming joystick or a mouse while the IconTroller is in use.

Suncom Incorporated, 312-459-8000 (see address list, page 14).



The IconTroller mounts on the side of your 64 or 128. A feed-through jack makes use of another input device possible. *READER SERVICE NO. 276*

AMIGA ACCOUNTING

New financial packages for the Amiga from Oxxi:

Nimbus ($149.00) eliminates some of the drudgery involved in small business cash management with predefined reports, an editable chart of accounts, and a single entry method. The program's multitasking capabilities give it constant access to the General Ledger, Accounts Payable, and Accounts Receivable sections; data entry in any of the three causes the other two to be automatically updated. Written in C, *Nimbus* allows over 450K of company data to be entered on a single disk.

The *MaxiPlan* spreadsheet has been released in two new versions: *MaxiPlan 500* ($149), optimized for a 512K environment, and *MaxiPlan Plus* ($199), with new macros, faster recalculation speed, and a print spooler. Both versions offer X-Y (scatter), 3-D pie, 3-D bar, exploding pie, step, and hi-low chart styles.

Oxxi Inc., 714-999-6710 (see address list, page 14).

GET A GRIP

Handle 128 ($19.95) gives the user exactly that on some of the computer's functions, through the Terminal Setup Menu (display and set the time, choose console color scheme, select terminal parameters), the Sequential File Utility Menu (scratch, rename, copy, append, verify BAM, format, collect), and the Sequential File Transfer Menu (choose I/O devices for creating or transferring files). A 30 day unconditional guarantee is included.

Solomon Software Systems (see address list, page 14).

ART PROGRAM

The *Advanced OCP Art Studio* ($39.95), a hi-res drawing package that allows the C-64 artist to modify color attributes, incorporates windows, icons, pull-down menus, and pointing devices. Provided are 16 pens, 8 random strays, and 16 user-definable brushes, plus 3 magnification levels with pan and zoom, pixel clear, and plot functions. Windows can be inverted, cut-and-pasted, enlarged, reduced, squashed, stretched, flipped and rotated. Textwise, there's a font editor, 9 character sizes, and more. Included are Art Studio and Advanced user guides, and two program disks containing several sample creations.

Firebird (see address list, page 14).

SUPER SNAPSHOT

Version 2.0 of the *Super Snapshot* screen dumping program adds the ability to dump any hi-res or multicolor screen to disk. A switch on the side makes the cartridge invisible in 64 mode, allowing C-128 owners to boot 128 software without removing the cartridge. Price is $54.95; version 1.0 owners can upgrade by sending their old cartridge plus $15. Both prices include postage and handling.

Computer Mart, 206-695-1393 (see address list, page 14).

Reader Service No. 243

DEBUGGER

The *Micro Detective* debugging system offers such tools as automatic error detection/analysis and advanced tracing capabilities. A programmer's utility kit includes 30 commands and a built-in cross reference of variables; an editing feature permits the programmer to scroll up and down a listing. For the C-64; $49.95 (shipping included).

American Made Software, 916-652-5338 (see address list, page 14).

NO FISH STORY

For every rotten apple, there's a plum. Ralph Lees of Poseidon Electronics read our notice in the August *Scuttlebutt* about Schneider Software's failure to fulfill orders for their $2.00 disk-based CP/M catalog. Concerned about the bad name incidents like this give the mail order industry, Ralph has offered to send his own CP/M catalog at half price ($1.00 plus a 73¢ SASE) to anyone who placed a $2.00 bet on Schneider's integrity and lost. Have no doubts about Poseidon's integrity, though—we know Ralph Lees personally and are happy to vouch for him. Be certain to mention both Schneider and *Ahoy!* when you order the catalog.

Poseidon Electronics, 212-777-9515 (see address list, page 14).

BANK STREET DATABASES

Sunburst and the Bank Street College of Education have announced six new C-64 databases for use with the *Bank Street School Filer.* The databases offer teachers quick access to information on the subjects of Animal Life, Astronomy, Endangered Species, North America, Space, and the United States. Teacher's guides provides numerous lessons, suggestions for classroom discussions, and reproducible activity sheets. Each package (copyable disk, backup, and guide) sells for $59.

Sunburst will send a videotape, "Using Databases in the Classroom: Bank Street School Filer", on free 30-day loan to teachers who request it.

Sunburst, 914-769-5030 or 800-431-1934; in Canada 800-247-6756; in AK call 914-769-5030 collect (see address list, page 14).

SPEECH DIAGNOSIS

A C-64 disk designed to assist teachers in identifying speech and language problems in preschoolers through third graders includes a speech screening guide, speech/language/hearing test request form with parent authorization section, and a parent guide, "10 Ways to Improve Speech Skills at Home." Price is $15.00.

Hilltop Speech and Language Service, 213-490-0210 (see address list, page 14).

AMIGA TV GRAPHICS

VideoScape 3D ($199.95) lets Amiga users produce "TV quality" graphics and animations with as little as 512K RAM (though 2 megabytes or more is recommended). This is accomplished through three programs: Designer 3D, for making 3D objects (via entry of X,Y,Z coordinates or point-and-click); PlayANIM, for playing animations back in real time; and VideoScape 3D, for making the finished video, plus utilities for creating geometric shapes like spheres, cones, rectangles, and fractal landscapes.

Aegis Development, Inc., 213-392-



VideoScape 3D *lets the Amiga user create graphics via X,Y,Z coordinates or with one of the supplied utilities.* *READER SERVICE NO. 277*

9972 (see address list, page 14).

64/128 & AMIGA GAMES

Two from Firebird, each $39.95 for the 64, $44.95 for the Amiga:

Knight Orc, a three-part graphic adventure, posits the player as an oppressed orc who gets a chance to take his revenge on mankind. An advanced language interpreter and a 1000- word vocabulary make high-level commands possible.

Sequel to *The Pawn, The Guild of Thieves* also takes place in the mythical kingdom of Kerovnia, though the neighborhood has deteriorated somewhat since the player's previous visit. Included with the adventure game are a 40-page novella, play guide, and other materials.

Firebird (see address list, page 14).

The lovely Daphne is trapped in *Arazok's Tomb* ($49.95), and you, an ace reporter, must comb the forests of Scotland, looking above and below ground for clues to her whereabouts. The graphic adventure is Aegis' first game for the Amiga.

Aegis Development, Inc., 213-392-9972 (see address list, page 14).

A mystery for the C-64 with over 2000 different solutions, *Intrigue!* ($34.95) requires you to find your missing brother Joe, a detective who had been investigating a scheme to release a dangerous virus into the air of the nation's capital. You must interact with characters at various locations in Washington to find Joe, deactivate the device, and finger the villain(s).

Spectrum HoloByte, 415-522-3584 (see address list, page 14).

C-64 and Amiga versions of *Dark Castle*, the Macintosh action/adventure game, will be released this fall by Three-Sixty Inc.

Three Sixty Inc., 408-879-9144 (see address list, page 14).

Nord and Bert Couldn't Make Head or Tail of It comprises eight interac-



tive short stories that take place in the offbeat Town of Punster. The reader restores order by deciphering messages full of double meaning and word trickery. In Shake a Tower, for example, you'll dine with lunching mobsters and munching lobsters as you interpret spoonerisms; in Buy the Farm cliches will take on literal meaning. $34.95 for the C-64, $39.95 for the Amiga.

Infocom, Inc., 617-492-6000 (see address list, page 14).

Activision and FASA Corporation, publishers of the BattleTech series of science fiction and role playing board games, have agreed to jointly develop adventure software based on FASA's products.

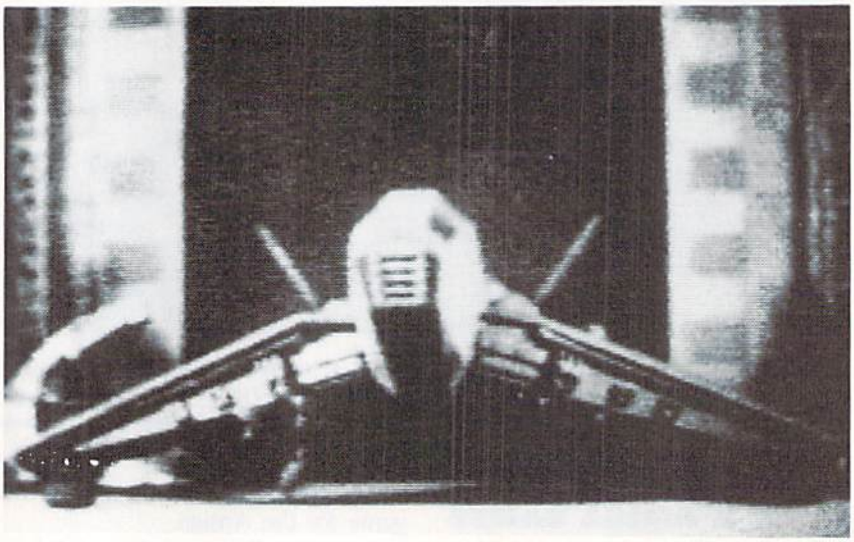
Activision, 415-960-0410 (see address list, page 14).

forward and reverse thrusters, twin 3-D screens, real-time infrared graphics, computer information data link, and onboard subatomic analyzer/decoder. For the 64; $44.95.

The Lip Stik, a voice-activated control headset designed for use with *Echelon*, is included with the game.

Access Software, 801-298-9077 (see address list, page 14).

California Games ($39.95) lets one to eight totally mellow C-64 gamers compete in events like Half Pipe Skateboarding, Foot Bag, Surfing, and Roller Skating. Over 3000 prizes valued at over $80,000, ranging from Kawasaki Jet Skis to Costa Del Mar sunglasses, will be given away through an Instant Winner Game packaged in each game box and through radio promotions. An



The pilot of Echelon's *Lockheed C-104 Tomahawk watches the action on twin screens displaying 3-D graphics.* *READER SERVICE NO. 278*

The *Echelon* 3-D space flight simulator centers around a secret military facility where a few highly skilled pilots will be trained to operate the 21st century's most advanced combat and exploration vehicle, the Lockheed C-104 Tomahawk. Through a series of simulators, you'll learn to operate the C-104 to its maximum potential. When you've got the right stuff, you'll be assigned a patrol zone, where through retrieval of artifacts and information you must make sense of a series of mysterious events occurring inside the area. The craft features four weapons systems, bidirectional teleporter unit, unmanned RPV (Remote Piloted Vehicle), antigravity braking and hovering,

Amiga version will follow in the fall.

Epyx, Inc., 415-366-0606 (see address list, page 14).

Spinnaker will distribute the Australian *Bazooka Bill* ($19.95) in the US under its UXB label. The title character in the C-64 adventure game is a one-man battalion armed with every weapon imaginable, which he uses to fight off an endless stream of enemy soldiers, tanks, trucks, and aircraft.

Spinnaker Software, 617-494-1200 (see address list, page 14).

The following from Accolade:

Apollo 18: Mission to the Moon ($29.95) makes it possible to recreate any of the original 1960's moon missions on the 64. Screen graphics are



Designed for use with Echelon, *the Lip Stik voice-activated headset is used to control various ship activities including the vehicle's weapons systems.*

based on actual footage of the missions. The player assumes the roles of mission control specialist and astronaut, with a variety of precision tasks to perform from prelaunch to splashdown.

Test Drive puts a player behind the wheel of some of the world's top sports cars, such as the Lamborghini Countach and the Ferrari Testarosa. The interior of the car and the road are seen from the driver's viewpoint, providing the sensation of an actual test drive. The object is to cover different sections of an ordinary highway within a time limit. $29.95 for the 64; $44.95 for the Amiga.

Mini-Putt ($29.95) offers a lighthearted approach to miniature golf with cartoon-style animation and wacky courses and holes. Each course has a theme such as famous movies or countries around the world, and each hole depicts characteristics of the theme in animated detail. Three varieties of obstacles are encountered: paths, requiring precise aim (bridges); setbacks, objects that interfere with the ball; and timing, requiring a shot at a precise moment (windmills).

Accolade, 408-436-0900 (see address list, page 14).

MODULA CONSTRUCTION

Benchmark ($199) provides a Modula-2 program development environment for Amiga users via three modules: an Editor (with over 125 commands for dealing with multiple files, windows, and buffers), a Compiler (implementing the entire Modula-2 language and compiling programs at an average speed of 10,000 lines per minute with burst speeds of up to 30,000 lines per minute), and a Linker (activated by a single key). The program can be used immediately, with no installation. Included as well are Amiga hardware/software support libraries and standard Modula-2 libraries.

Oxxi Inc., 714-999-6710 (see address list, page 14).

REALIGNMENT

Free Spirit has added speed adjustment and end stop adjustment features to its 1541/1571 Drive Alignment program. The price remains $34.95.

Free Spirit Software, Inc., 312-352-7323 (see address list, page 14).

TOOLKIT RETOOLED

The Metacomco Toolkit ($49.95) has been upgraded, with Version 1.2 incorporating Unix-based Make and Touch utilities, purportedly twice as comprehensive as commercial utilities sold separately at twice the price of the entire Toolkit package. The program's

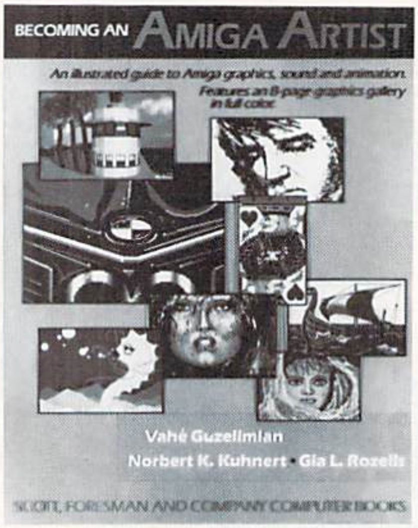
other AmigaDOS commands are Pipes, Librarian, Disassembler, Auxiliary CLI, Mount, Browse, Enlarge, Pack, and Unpack.

Metacomco (see address list below).

BOOKS

Becoming an Amiga Artist ($19.95) provides beginners and advanced users with tricks and tips for creating charts, graphs, paintings, digitized images, animation, and sound and speech, both in AmigaBASIC and via programs like *AegisDraw.* Also described are ways to reproduce screens on printers, plotters, VCRs, and with 35mm cameras. A number of type-in programs are included.

Scott, Foresman and Company, 312-729-3000 (see address list below).



Tips on making charts, graphs, more.
READER SERVICE NO. 279

The Big Tip Book for the Commodore 64/64C/128 ($16.95) details hundreds of shortcuts developed by users, concerning everything from hooking up equipment to advanced programming.

Bantam Books, 212-765-6500 (see address list below).

Commodore 128 Data File Programming focuses on the structure development, and use of program, sequential, and relative files in BASIC 7.0. Sample applications cover uses in the home, in education, in business, and in investment, among others.

TAB Books Inc., 717-794-2191 (see address list below).

PROGRAM SEARCH

Softwhere? is the name of a new service that will help users of all popular microcomputers, including Commodore, to find the programs suited to their particular needs by means of an information base of thousands of programs. A free copy of their booklet, "Guide for Selecting Computer Software," is available on request.

Softwhere?, 916-674-3688 (see address list below).

Companies Mentioned in *Scuttlebutt*

Access Software
900 South
Salt Lake City, UT 84105
Phone: 801-532-1134

Accolade
20833 Stevens Creek Blvd.
Cupertino, CA 95014
Phone: 408-446-5757

Activision, Inc.
2350 Bayshore Parkway
Mountain View, CA 94043
Phone: 415-960-0410

Aegis Development, Inc.
2210 Wilshire Blvd. #277
Santa Monica, CA 90403
Phone: 213-392-9972

American Made Software
P.O. Box 323
Loomis, CA 95650
Phone: 916-652-5338

Bantam Electronic Publishing
666 Fifth Avenue
New York, NY 10103
Phone: 212-765-6500

Epyx, Inc.
600 Galveston Drive
P.O. Box 8020
Redwood City, CA 94063
Phone: 415-366-0606

Firebird Licensees
P.O. Box 49
Ramsey, NJ 07446
Phone: 201-934-7373

Computer Mart
2700 NE Andresen Road
Vancouver, WA 98661
Phone: 206-695-1393

Free Spirit Software, Inc.
538 South Edgewood
LaGrange, IL 60525
Phone: 312-352-7323

Hilltop Speech and Language Services
3330 Lewis Avenue
Long Beach, CA 90807
Phone: 213-490-0210

Infocom, Inc.
125 CambridgePark Drive
Cambridge, MA 02140
Phone: 617-492-6000

Metacomco
26 Portland Square
Bristol BS2 8RZ
United Kingdom

Oxxi Inc.
1835-A Dawns Way
Fullerton, CA 92631
Phone: 714-999-6710

Poseidon Electronics
103 Waverly Place
New York, NY 10011
Phone: 212-777-9515

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1900 East Lake Avenue
Glenview, IL 60025
Phone: 312-729-3000

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P.O. Box 3336
Yuba City, CA 95992
Phone: 916-674-3688

Solomon Software Systems
24285 Sunnymead Blvd.
Moreno Valley, CA 92388

Spectrum HoloByte
1070 Marina Village Parkway #203
Alameda, CA 94501
Phone: 415-522-3584

Spinnaker Software
One Kendall Square
Cambridge, MA 02139
Phone: 617-494-1200

Sunburst Communications
Pleasantville, NY 10570
Phone: 914-769-5030 or 800-431-1934

Suncom Incorporated
260 Holbrook Drive
Wheeling, IL 60090
Phone: 312-459-8000

TAB Books Inc.
P.O. Box 40
Blue Ridge Summit, PA 17214
Phone: 717-794-2191



PLATFORMS

For the C-64

By Tony Brantner

Platforms is a one-player arcade game for the Commodore 64 which brings new meaning to the phrase "go for the gold."

Use *Flankspeed* (page 95) to type in and save a copy of *Platforms.* Before running the game, be sure to have a joystick plugged into Port 2.

When the game begins, you are standing on the first of six platforms. Each moves up and down on a shaft, changing direction at random. At the top of each shaft is a gold ring. Touching a ring earns you the corresponding number of points shown above it. You can run on a platform by moving the joystick to the left or right (you cannot run off the edge). To jump from one platform to another, or to jump up and grab a ring, press the fire button and move the joystick in the direction that you want to go (left, right, or centered). If you fail to land on a platform, you will lose one of your lives.

There are also killer corkscrews to contend with. These slinky little devils twist their way up and down the shafts. When they hit a platform from underneath, it becomes electrified. If you try to jump on an electrified platform, or happen to be standing on one, you will be knocked off, losing a life in the process. Fortunately, the electrical charge lasts only a few moments.

Collect all six rings, and you will move on to the next level which is a little faster. Although you begin the game with only three lives, bonus lives are awarded for every 10,000 points scored. You can hold a maximum of nine in reserve. The game can be frozen by pressing the SHIFT LOCK key. Once you run out of lives, press any key. The high score will be adjusted if necessary, and you can play again. □ *SEE PROGRAM LISTING ON PAGE 99*

PHOTO: MICHAEL R. DAVILA

We didn't mean to set the world on fire.



Honestly, we'd be the first to tell you that if *all* you're interested in are Adventures, stick with your usual brand of software. Simulations only? Keep reaching for them in the same familiar packages! But if you enjoy entertainment software, you probably enjoy the excitement of a whole range of challenges — Adventures and Strategies for long rainy weekends, Arcade games for exhilarating evenings, Simulations when you need to get away from it all, and Productivity software when you're feeling — well, productive. For people like you, Firebird offers top-quality interactive software in virtually *every* category.



If it's Adventure you're after, here's the breathtakingly illustrated GUILD OF THIEVES, with its revolutionary text-handling system.



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Firebird software for Commodore 64 systems, including the popular Golden Path, Pawn, Colossus Chess IV, Cholo, Talking Teacher, Concise Music System and Advanced Music System, is available from $24.95 to $59.95.

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How About This Ball of Fire From Firebird!



This is SENTRY, a unique Strategy game with over 10,000 full-color 3D vector landscapes and four-way scrolling. Do you have truly exceptional concentration and near perfect hand/eye coordination? Then maybe — just maybe — you possess the skill to outwit the Sentry at each level of the extraordinary challenge.



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Reader Service No. 231

SPRAY-CAM

For the C-64

By Bob Blackmer



This program is more of a "life experience" than an arcade game. I sometimes prefer doing something real to shooting aliens, which I doubt any of us will ever do. Science fiction is great, but there is a limit.

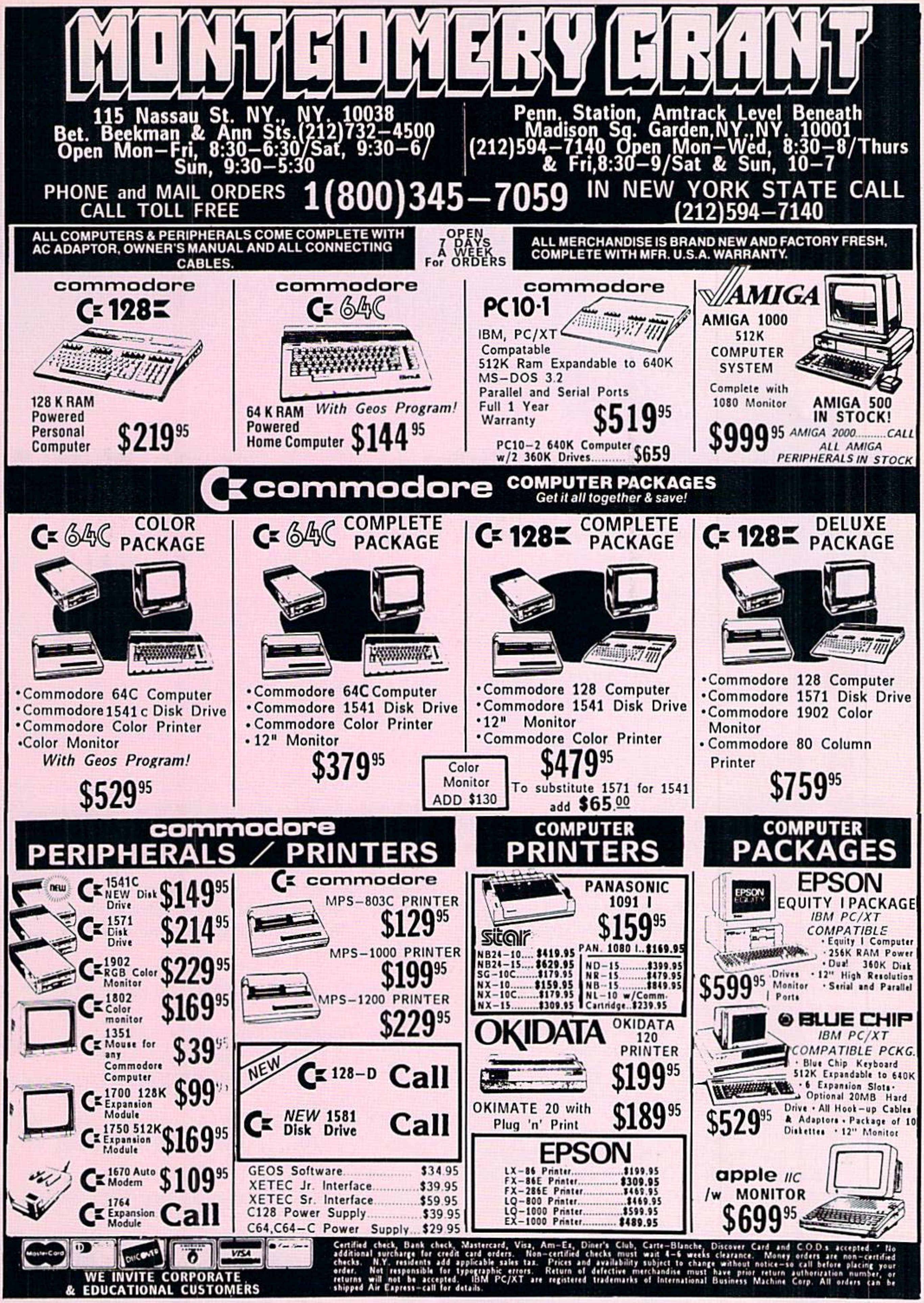
The object is to inspect and repair the four main exhaust stacks of a sprawling industrial complex. Because of hazardous working conditions, a new system has been put in operation. The Spray-Cam is a remote controlled video and repair unit that allows the operator to inspect and repair any decayed areas within the exhaust stacks, while you are safe in an enclosed room high atop the complex. (Eat your heart out, David Letterman. The Spray-Cam is assuredly more technical than a monkey-cam!)

To operate this highly complex piece of equipment, use a joystick in Port 2 to highlight the operation you want and press the fire button. At the top of the control board are the controls which operate the main unit. The left and right arrows move the trolley back and forth to center the Spray-Cam over a stack. The up and down arrows raise and lower the unit within a smokestack. The next section of the control board, which is labeled VIEW, allows you to change the orientation of the video camera. The arrows select the four views available. The current view will remain highlighted. At the bottom of the control board is a button labeled REPAIR. When activated it will spray a special material that fuses with the brick to repair any defective areas you may find.

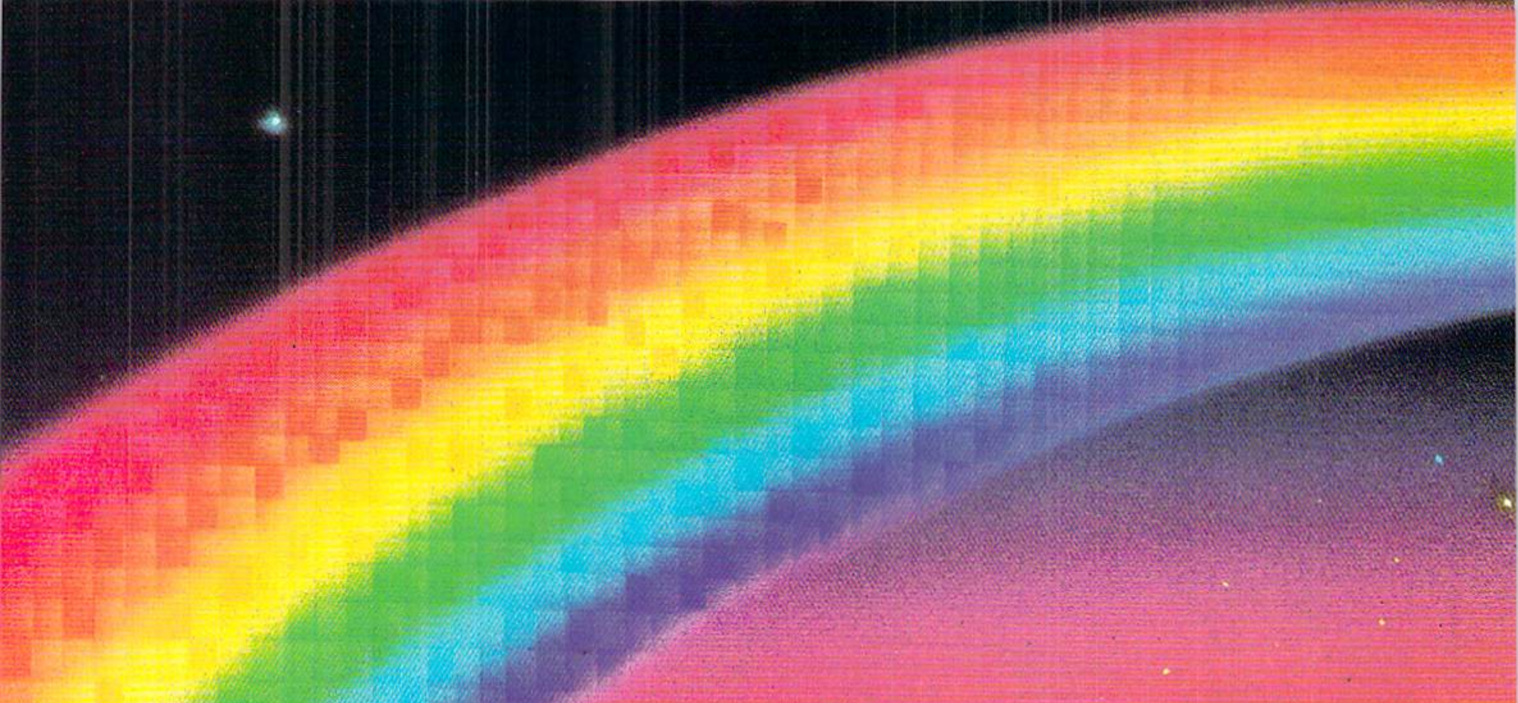
Looking at the girder the trolley runs on, you will see markings directly above the stacks. This is where you must position the unit to go up or down. Once the unit is down, the left-right mechanism is inoperable. (No sense smashing the equipment if you make a mistake.) The video camera is a special infrared device that only works properly in darkness, which is why you see interference on your monitor when not down a chimney. When you feel you have inspected and repaired the stacks completely, move the trolley to the right end of the beam. If you still see interference on the monitor, the system is still detecting areas in need of repair. If you have done your job thoroughly, the monitor will display an ALL CLEAR. There, you've just completed a job that pays $25,000 a year. Where else but *Ahoy!* can you get employment training for less than three bucks?

With apologies to Benn Dunnington, *Spray-Cam* is written in machine language and must be entered using *Flankspeed* (see page 95). After typing in and saving *Spray-Cam*, reset the computer and LOAD "SPRAY-CAM",8,1. Then SYS 49152 to start. ☐***SEE PROGRAM LISTING ON PAGE 96***

PHOTO: MICHAEL R. DAVILA



Reader Service No. 245



To store and manipulate data efficiently within your programs, you must choose the proper data structures. Simple numeric and string variables are fine for dealing with single, independent quantities. More complicated and interrelated quantities demand more sophisticated types of variables.

BASIC does not provide a very rich variety of data structures. Besides simple variables, the only other type of data structure explicitly supported in BASIC is the array. Fortunately arrays can be used to duplicate the function of any other data type.

This month we will review arrays in BASIC and investigate a very useful form of data storage, the linked list. We will see that the proper choice of data structure significantly affects your efficiency in writing programs as well as the speed of the programs themselves.

ARRAYS IN REVIEW

We have previously discussed BASIC one- and two-dimensional arrays (see *Rupert Reports* in the May '84 and November '84 *Ahoy!*). Admittedly that was a long time ago, so a review is in order.

An array is a data structure that can be used to store information of a sequential nature. Suppose you are writing a program that will deal with the colors of the spectrum. You might want to print the names of the colors alphabetically or in random order or in spectral order. In any case, there will be some sequence associated with this color data.

It would be impossible to store the color names in simple variables. For example, we could have

```
A$="RED" : B$="BLUE" : C$="GREEN"
```

and so forth. This simple data structure is very limiting. For example, how could your program sort and print these colors alphabetically? It would be cumbersome at best. Something like this might work:

```
10 IF A$<B$ AND A$<C$ THEN PRINT A$ : GO
TO 40
20 IF B$<A$ AND B$<C$ THEN PRINT B$ : GO
TO 60
30 PRINT C$ : GOTO 80
40 IF B$<C$ THEN PRINT B$ : PRINT C$ : E
ND
50 PRINT C$ : PRINT B$ : END
60 IF A$<C$ THEN PRINT A$ : PRINT C$ : E
ND
70 PRINT C$ : PRINT A$ : END
80 IF A$<B$ THEN PRINT A$ : PRINT B$ : E
ND
90 PRINT B$ : PRINT A$ : END
```

This program is, in a word, absurd. If the program you are writing requires contortions like these, then you should definitely be using a different data structure.

The simple variables in the example above are not useful for representing sequential data, that is, data in which the various values are related to one another. Arrays simplify the tasks of sorting, shuffling, and storing related data.

Here is how the same program could be written using an array.

```
1 D$(0)="" : D$(1)="RED" : D$(2)="BLUE"
: D$(3)="GREEN"
5 REM - PERFORM INSERTION SORT -
10 FOR N=2 TO 3 : T$=D$(N) : K=N
20 IF D$(K-1)>T$ THEN D$(K)=D$(K-1) : K=
K-1 : GOTO 20
30 D$(K)=T$ : NEXT N
40 FOR N=1 TO 3 : PRINT D$(N) : NEXT N
```

The color values are stored in the array D$( ). D$ refers

A Rainbow of Data Structures

ARRAYS, LISTS, AND LINKED LISTS

BY DALE RUPERT

not to an individual data item but to a collection of data. Each specific item in the collection is identified by the *subscript* within parentheses. Each data item is an *element* of the array.

Graphically, the data in the array looks like this:

Subscript	1	2	3
Data	RED	BLUE	GREEN

The subscripts provide an index or a pointer by which the program can choose any data item.

Lines 10 through 30 in the program above sort the data values alphabetically with an algorithm called an insertion sort. The data values are moved around within the array. Once the sorting is finished, the D$ array looks like this:

Subscript	1	2	3
Data	BLUE	GREEN	RED

Clearly the second program is far better than the original version which did not use arrays. Arrays provide a lot of flexibility in organizing and selecting data.

Suppose you want to add another color to the list. Modifying the first program to sort and print four items would be a monumental task. The resulting program would be even uglier than before.

On the other hand, it is nearly trivial to modify the second program for more data items. Simply define the new data and change the 3s in lines 10 and 40 to the desired number of items. You must add a DIM statement if the array will have subscripts greater than 10.

NODES AND LISTS

We have seen that arrays are superior to simple variables for storing and arranging related data. One disadvantage of arrays is that they are strictly sequential in nature. If we want to reorganize the data in an array, we must actually move the data values around within the array. We will see that this can be very time-consuming in some applications.

The next data structure we will consider is the list. The data in a list is stored in a structure called a *node.* We said that each data item in an array is an *element* of the array. An *element* of an array is comparable to a *node* of a list. The main difference between an element of an array and a node of a list is that a node may be subdivided into fields. Each field stores a data item.

Suppose we want to keep track of colors in the rainbow and their corresponding wavelengths measured in nanometers. A list structure for such data might use a node with two fields like this:

Field #1	#2
Color Name	Wavelength

A list of color data can be represented as follows:

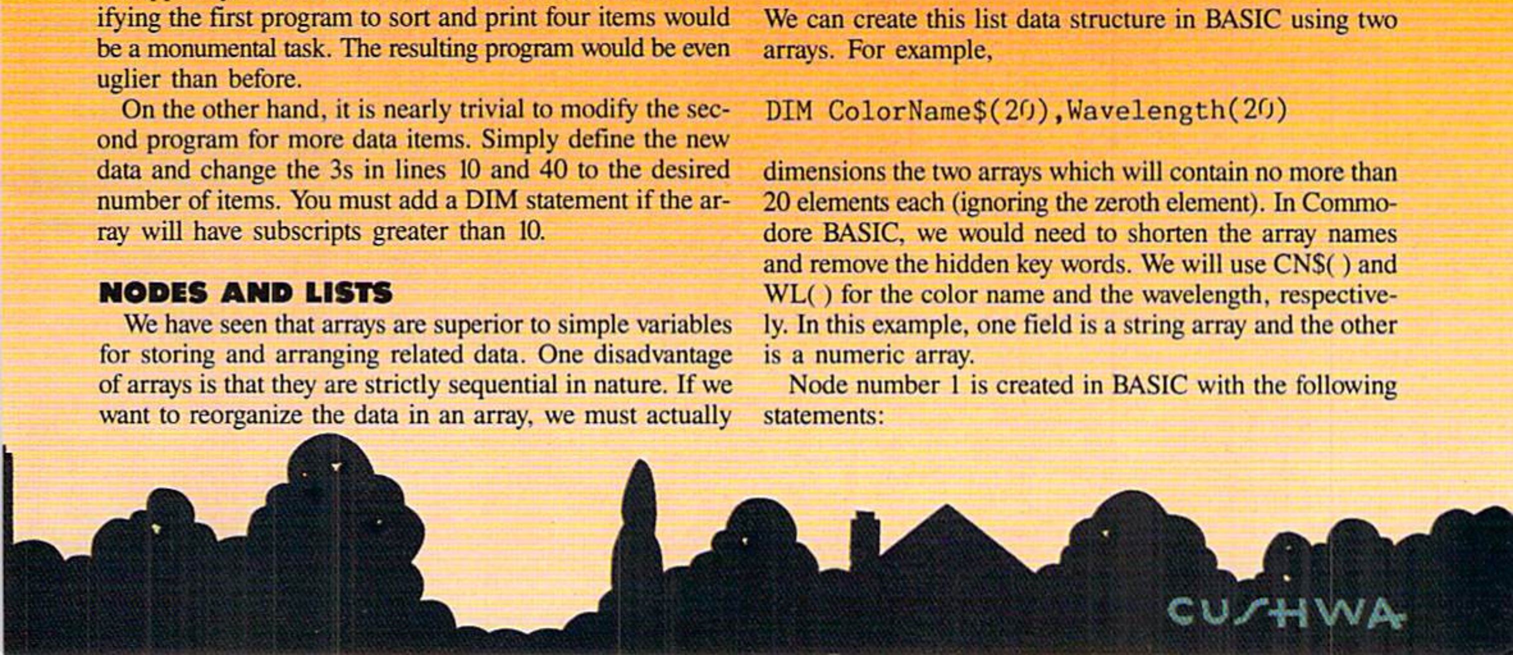
Node # 1		2		3	
RED	700	BLUE	470	GREEN	500

We can create this list data structure in BASIC using two arrays. For example,

```
DIM ColorName$(20),Wavelength(20)
```

dimensions the two arrays which will contain no more than 20 elements each (ignoring the zeroth element). In Commodore BASIC, we would need to shorten the array names and remove the hidden key words. We will use CN$( ) and WL( ) for the color name and the wavelength, respectively. In this example, one field is a string array and the other is a numeric array.

Node number 1 is created in BASIC with the following statements:



```
CN$(1) = "RED" : WL(1) = 700
```

The other nodes are created similarly. Notice that the subscript of the array corresponds to the node number.

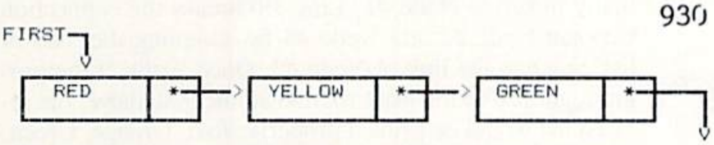
Clearly there is nothing "magical" or mysterious about the list structure. Undoubtedly you have used multiple arrays in your programs in a similar manner.

Our goal here is to formalize these structures and to use the nomenclature generally associated with them. When you look at a book of algorithms which describes everything in terms of nodes and lists, you will know what they are talking about.

NOW FOR THE LINKS

The next data structure we will discuss is the singly linked list, or simply, the linked list. The linked list is a useful structure for groups of related data which must be accessed sequentially. Linked lists provide the advantage over simple lists of being easily modifiable. We will see that it is easy to insert and delete data items in a linked list, something that can be very time-consuming with the simpler data structures.

The key to linked lists is an item called a "link." A link is a piece of data which indicates how one data item or node in a list is related to another item. Graphically a linked list looks like this:



This linked list consists of three nodes. Each node contains two data items, a color name and a link. The link is shown as an asterisk with an arrow coming from it. FIRST is a separate variable which indicates the start of the linked list. Each link points to the next node in the list. The link of the third node is a special quantity which indicates the end of the list.

In Pascal there is a special data type called a pointer. The pointer is a standard way of implementing links. Since BASIC doesn't have explicit pointers, we must synthesize them.

To represent the data shown above, we will use two arrays, NFO$( ) and LNK( ). NFO$( ) (as in "info") is a string array which will store the information, in this case the color names. LNK( ) is a numeric array which stores the links.

What are the links? Each link is nothing more than the value of the subscript of the next node in the list. Here are the BASIC statements for this linked list:

```
10 FIRST = 1
20 NFO$(1) = "RED" : LNK(1) = 2
30 NFO$(2) = "YELLOW" : LNK(2) = 3
40 NFO$(3) = "GREEN" : LNK(3) = -1
```

In order to add items to this list, we will also use a variable called NXT. This quantity indicates the next available node number in the list. It is initialized with

```
50 NXT = 4
```

Recall that the node number merely refers to the subscript of the array element.

With the preliminaries understood, let's see what we can do with this linked list. It is easy to add a node to the end of the list. For example, to put "BLUE" in its proper place after "GREEN" which is node 3, we would use the the following statements:

```
100 LNK(3) = NXT
110 NFO$(NXT) = "BLUE"
120 LNK(NXT) = -1
130 NXT = NXT + 1
```

Line 100 sets the link of node 3 ("GREEN") to the next available node which is 4 in line 50. Line 110 stores the data in the new node, and line 120 sets the link of the new node to −1 to indicate that this is the last node in the list. Line 130 updates the "next node" pointer.

The following routine steps through the nodes sequentially and prints the data from each information field:

```
900 N = FIRST
910 PRINT NFO$(N)
920 N = LNK(N)
930 IF N<>-1 THEN GOTO 910
```

The index N is set to point to the first node in line 900. Line 910 prints the information portion of that node.

Line 920 in the above routine shows a nifty characteristic of linked lists. In order to locate the next node in the list, just read the link value that is stored in the current node. If that link value is not −1, the program loops back for additional printing. If the link value is −1, the program has reached the end of the list, and the program ends.

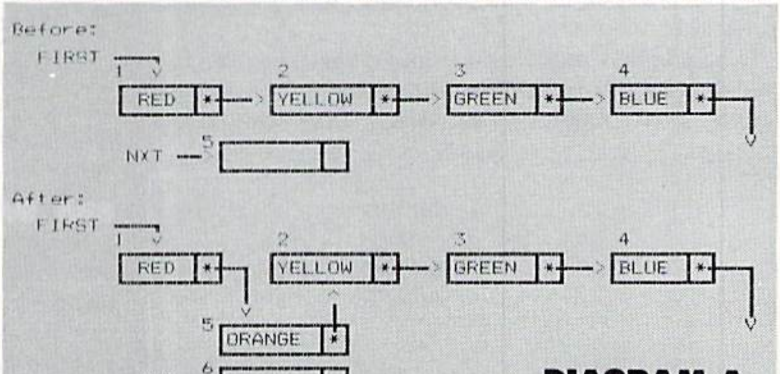


DIAGRAM A

COLORFUL MANIPULATIONS

Linked lists really shine when data must be inserted or deleted in the midst of the list. For example, to insert "ORANGE" after "RED", the procedure looks graphically as in Diagram A above. The numbers above are the Node Numbers which are actually the subscripts of the arrays. You will notice that the array subscripts no longer repre-

sent the sequential order of the list.

The program to insert a node after Node #1 as shown in Diagram A above is as follows:

```
200 OLDLNK = LNK(1)
210 LNK(1) = NXT
220 LNK(NXT) = OLDLNK
230 NFO$(NXT) = "ORANGE"
240 NXT = NXT + 1
```

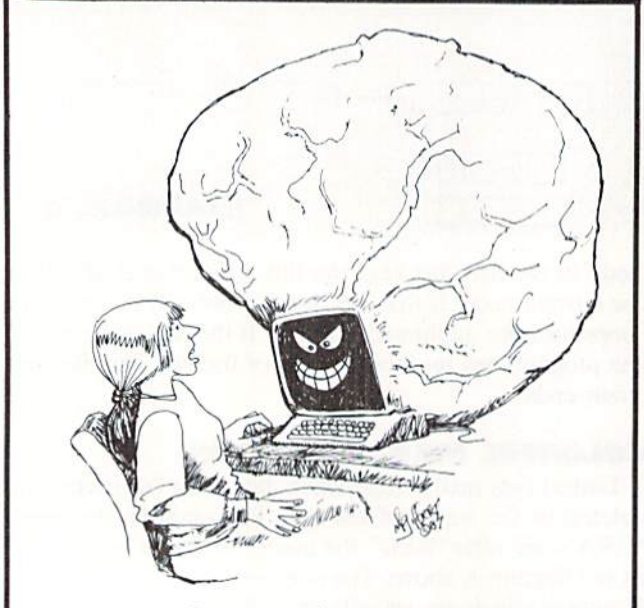
Line 200 saves the original value of the first node's link. Line 210 updates Node 1's link to point to the new node. Line 220 stores the original link from Node 1 as the link of the newly inserted node. The information value of the new node is written in line 230. The value of the NXT pointer is incremented to show the next available node number in line 240. That's all there is to it.

The current values of the variables are

Node #	NFO$	LNK
1	RED	5
2	YELLOW	3
3	GREEN	4
4	BLUE	–1
5	ORANGE	2

The node # corresponds to the subscript of the array. To follow the path through this list, notice that the link from Node #1 points to Node #5. The link from Node #5 is to Node #2. Node #2's link leads to #3 which points to #4. Node #4 has a link value of –1, hence it is the last item in the list.

If the program jumps to the print routine at line 900 discussed earlier, the list will be printed in the order just described: Red, Orange, Yellow, Green, Blue. The node # no longer indicates the sequence of the list. The sequence is established by following the links.



One upgrade too many.

Removing a node of a linked list is a very easy task. Graphically the process to remove Node #2 ("Yellow") is as follows:

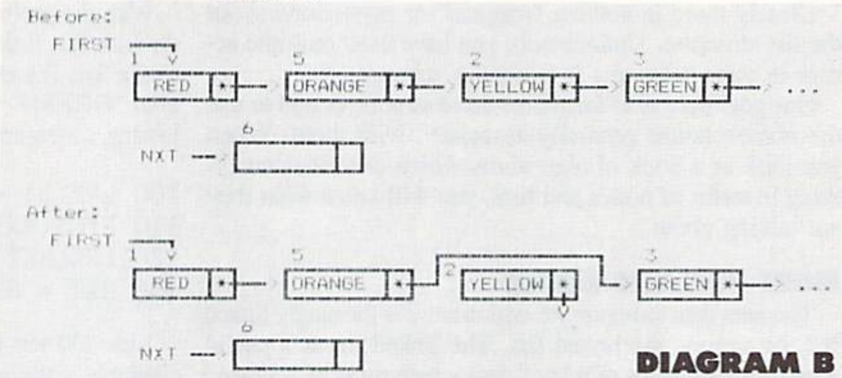


DIAGRAM B

Here is the program to remove Node #2 ("Yellow") as depicted above. We simply reroute the link from the preceding Node #5 to point to the succeeding Node #3:

```
300 LNK(5) = LNK(2)
310 LNK(2) = -1
```

Line 300 sets the link of Node #5 to point to the node originally linked to Node #2. Line 310 breaks the connection between Node #2 and Node #3 by assigning the "end of list" value to the link of Node #2. Once again, if the program jumped to the print routine at line 900 above, the revised list would be printed properly: Red, Orange, Green, Blue.

Node #2 is left unused and unavailable. If memory is very limited and if many such deletions would occur, a more complicated scheme could be implemented to reuse any nodes deleted from the list. To do this would require using another linked list for available memory. NXT would be updated, and links in the "available memory" list would be revised whenever a node was removed from the original list.

END OF THE RAINBOW

If you are not totally convinced that linked lists are relatively easy and worthwhile to use, keep reading. For a grand finale, we will run some benchmark tests with simple arrays and with linked lists, comparing their abilities to insert and delete data.

The tests overwhelmingly show the reason for using linked lists. When large numbers of items within ordered data lists must be added or deleted, linked lists really shine.

To see one disadvantage of simple array lists, look at the steps needed to add a single data item between two others. For example, insert "Orange" between "Red" and "Yellow" in this list.

Before:

Subscript #	1	2	3	4	5
Data	RED	YELLOW	GREEN	BLUE	(empty)

During:

Subscript #	1	2	3	4	5
Data	RED	(open)	YELLOW	GREEN	BLUE

After:

Subscript #	1	2	3	4	5
Data	RED	ORANGE	YELLOW	GREEN	BLUE

First, all values from "Yellow" to the end of the list must be moved to the next higher subscript value to make room for the new data. Those results are shown in the "During" phase above. Then the new data item can be written into the available space.

If there are one thousand items in the list, and a new item must be inserted between numbers 1 and 2, a large amount of data must be shuffled. This can take quite a long time.

Deleting an item from a simple list is similarly time-consuming. The procedure is nearly the same as for inserting an item except that all items to the right of the deletion must be moved left.

Run the program *Linked List Showoff* (page 98) to see how significant the time differences are. The program creates a simple array of 500 consecutive odd integers from 1 to 999, and it creates a linked list of the same values. The program then inserts 500 even integers from 2 to 1000, one after each odd value in the two original lists. Next the 500 odd integers are deleted from the two lists, and the resulting lists of even integers are printed. The times to create, modify, and print the two lists are displayed.

This program emphasizes the advantages of linked lists. In fairness, we should point out that the simple array does have some advantages. It uses less memory than the linked list. Also, the simple array needs less time to be printed since its subscript is simply incremented to step through the list. Using links to step through the linked list for printing is somewhat more time-consuming.

Searching for an item in an array list may be quicker under some circumstances than searching through a linked list. In this sample program, these advantages of a simple array list are obviously outweighed by the insertion/deletion capabilities of the linked list.

Change NUM in line 50 to increase the number of odd integers in each list. You will find that doubling NUM doubles the time for the linked list, but it quadruples the time for the simple array. As the number of items increases, the advantage of linked lists becomes even greater.

This month we have covered singly linked lists. The links always point toward the succeeding item in the list. In a future article we will see that when we are lost in a maze, it can be useful to have links leading us back to our previous locations. Doubly linked lists as well as other sophisticated data structures will be the topic of further discussions in this column.

In the meantime, if you are having troubles keeping the data in your programs under control, see if linked lists are appropriate. A linked list just might be the pot of gold at the end of the rainbow. ☐

SEE PROGRAM LISTING ON PAGE 98

ALL NEW

C128 Helper

THE FIRST ELECTRONIC C128 REFERENCE MANUAL!

If you've ever found yourself needing information while right in the middle of programming, have we got a utility for you!

The C128 Helper is the first electronic reference manual for the C128. Let's say that you're right in the middle of writing a program in the powerful Basic 7.0 language when you realize that you need more information on a specific command. Just touch the C128's HELP key. Almost instantly (thanks to the 1571's "fast" mode) a menu appears on your screen. Just select the command in question, and moments later a full screen of detailed information appears, including an example showing the command in use. And at the touch of another key, that screen of data is dumped to your printer. You're then returned to your Basic program, exactly where you left off!

The C128 Helper is machine language driven for speed. It works in the C128's 80 column mode with an RGB or composite monitor. You can use either a 1571 or, with slower response time, a 1541 drive.

The C128 Helper is co-resident with your Basic program. With it, ALL Basic 7.0 commands and functions are detailed with full explanations and examples. It also allows you to perform a screen dump from Basic.

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COMAL COLUMN

Full Disclosure

By Richard Herring

Several of you have written to ask me about the COMAL Users Group USA. That seems natural enough since my *COMAL Column* and their ads both appear in these pages. Well, it's probably time to disassociate myself.

I only write for *Ahoy!* and have no connection to the COMAL Users Group. Just like some of you, I buy books and programming aids from them. Every item in my COMAL library was paid for, and is my very own.

Now, let's proceed to answer your questions about the COMAL Users Group. The Group is, so far as I know, a small business that promotes the use of COMAL as a good language for both programming and learning. It markets a two-page list of COMAL materials, including books, disks, and a magazine.

The Group is, in fact, your one-stop shopping source for things COMAL. So let me tell you a little about the various programming aids that are available.

First, the COMAL language itself is available on disk or cartridge for Commodore computers. Version 0.14 is supplied on disk. Disadvantages of this version are that it leaves only 10K of RAM for you to write programs in, and that it lacks some of the powerful specialized commands of version 2.0. The big advantage of version 0.14 is that it can be found in many user group libraries where you can copy it, then check it out.

On the 0.14 disk are a tutorial and sample programs sufficient to get you started if you have some programming background. If you buy the $30 COMAL 0.14 Starter Kit, you'll also get two 60-70 page booklets (normally $7 each), *COMAL From A to Z* and the *COMAL Workbook*, six issues of the newsletter/magazine, and several program disks.

The *COMAL From A to Z* booklet is essentially an alphabetical listing of the key words in version 0.14, including graphics and sprites. The *COMAL Workbook* is a study guide, with exercises and self-tests, written for beginning programmers. It's aimed at about the high school level – it moves way too fast for little kids but will be fine for adults.

COMAL version 2.0 is available on a cartridge for $100 to $135 (depending on whether you want the Superchip that provides extra support for the 128). Or, for $139, you can get the cartridge with the extra chip, two manuals, and several sample program disks. Advantages of the cartridge version are quick loading, many extra commands, and 30K of programming space. Disadvantages are the cost and the inability for your friends to run your 2.0 programs (using the extra, powerful commands) under version 0.14.

Programs written under 0.14 will run under version 2.0 without too much effort on your part to convert them. But then that subject deserves its own column.

The Group also sells a newsletter/magazine called *COMAL Today*, published every 2-3 months. Each issue contains 80 pages (newsprint) of articles, tips, procedures, and sample programs – all dedicated to COMAL. You will find that only six to twelve of these pages contain ads. Once you have started serious programming in COMAL, the newsletter can be valuable. Much of it is user-written, so it might even be a place for you to break into print. Subscription rates run about $3 per issue.

Now let's move into books and booklets. *The COMAL Handbook* is a 470-page dictionary of commands for both versions 0.14 and 2.0. It also cross-references commands and shows short sample programs. This $19 book is one of the few COMAL books you might find at a local bookstore, since it is published by Reston.

Beginning COMAL, widely used in Denmark, was written by Borge Christensen, who was one of the two designers of COMAL over 13 years ago. The $21, 340-page book is about one half lessons and exercises and one half self-tests and program listings. You should be familiar with computers, but need not have prior programming experience, to make good use of this. The book takes small steps and offers the dedicated learner lots of chance for success.

Foundations in Computer Studies with COMAL, published in Ireland, is a 360-page introduction to structured programming in COMAL. It contains 121 sample programs and is written to cover the standardized version of COMAL which is available to run on several different computers. As a "foundations" textbook, it also covers the history and uses of computers as well as good programming practices in general. It's suitable for high school and college level learners and costs about $20.

Introduction to Computer Programming with COMAL 80 and the Commodore 64/128 is a 265-page learner's guide to the cartridge version. This book is published in the US by the COMAL Users Group for $20 and has a matching $7 answer book. Like the other learning guides, it is suitable for senior high and college students. It jumps in fast, so some familiarity with programming will help.

The *Cartridge Tutorial Binder* (titled *COMAL 80* on the front) is the 320-page tutorial for version 2.0 initially prepared in Denmark for Commodore. It takes you from setting up the computer to using assembly language routines in COMAL programs. This $25 notebook comes with the Deluxe Cartridge Pak.

Several 60- to 100-page booklets are also available on specific COMAL topics. The $7 *Cartridge Graphics and Sound* explains the expanded capabilities of the 2.0 cartridge. For 0.14 programmers, *Graphics Primer* ($15 with disk) is a beginner's tutorial to graphics and sprites.

Captain COMAL Gets Organized is a $15 introduction (with disk), focusing on modular programming. Two volumes titled *Packages Library* (each $20 with disk) show how to use packages of new commands in your programs. You should be familiar with COMAL programming for these. Last, *COMAL 2.0 Packages* focuses on how to write your own packages ($20 with disk). Consider this when you're ready for machine language programming.

Then, there are disks. For about $10 each, you can buy the disks to match any issue of the newsletter and most of

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the books. Plus you can buy disks on secondary school subjects, telecommunications, games, and on and on. Also check user group, public domain, and shareware libraries for disks. A medium-size local user group may well have a half dozen or more disks of COMAL programs.

The COMAL Users Group also sells versions of the language for CP/M computers, IBM-compatibles, and Apples (soon, they hope). Next on the list are keyboard overlays, and last, for the truly dedicated, COMAL tee shirts. Books purchased from the Group will have an additional shipping charge added.

Well, that's lots of ways to part us users from our money. So now I'll tell you how to save a buck. If you subscribe to the newsletter (minimum six issues for $19) you can get special member prices. Discounts range up to 66 percent, with most in the 5 to 30 percent range.

But wait, there's more. (No, I never sold steak knives!) The Group routinely runs specials for members with discounts of 50 percent or more off regular member prices.

The moral of our story? If you really get into COMAL programming (and COMAL is a language worth getting into), become a member and wait for the sale. Remember, I have nothing to lose, so I want you to get the most for your money.

Or, you may want to check your local bookstore for *Structured Programming With COMAL* by Roy Atherton (Wiley), *Starting with COMAL* by Ingvar Gratte (Prentice Hall), and *Adding Structure To BASIC With COMAL-80* by Max Bramer (Addison Wesley).

You can contact the COMAL Users Group USA at 608-222-4432 or at 6041 Monona Drive, Madison, WI 53716.

You can contact me at P.O. Box 1544, Tallahassee, Florida 32302. Let me know what you think and where you want to go. I'll be happy both to give my advice and to hear yours. Next month, we'll talk generally about how to learn to program and why COMAL is such a good language for just that. After that, with the help of several readers, we'll see just how fast COMAL is and how your programs can benefit. □

Tech Notes

1) Disk version 0.14 leaves only 10K of program memory, while cartridge version 2.0 leaves over 30K. How is this magic accomplished? Version 2.0 always uses the COMAL Kernal, but selects only those extension packages (sets of commands) that the programmer chooses. By not loading the graphics commands if you do not need graphics, version 2.0 saves memory. The cartridge has 64K of ROM that is bank-switched in 4 blocks, of 16K each, over the C-64's BASIC ROM and RAM.

2) Cartridge version 2.0 expands upon disk version 0.14's 140+ commands. It increases the number of sprite commands from 10 to 23 and graphics commands from 26 to 48. It adds many other special commands to support things like paddles, joysticks, and character fonts.

3) The 16K Superchip enhancement to the 2.0 cartridge supports the 128. While it does not give you a true 128 COMAL, it does allow the use of many 128 features. [Editor's Note: By the time you read this, a new C-128 COMAL 2.0 cartridge should be available for $200 with a manual and demo disk.] It will automatically enable the numeric keypad, autoboot a disk program if you name it "hi", display text and graphics on the 80-column screen (along with other 80-column capabilities), and speed up your disk drive accesses. It also provides BLOAD, BSAVE, RS-232 commands, string and math extensions, and about 100 new commands. The Superchip is user-installable if you are not afraid to open your cartridge and plug in a chip. Or you can get a disk-based version of the Superchip and link it into your programs.

4) Although it is relatively easy to move from BASIC to COMAL, you will have four things to remember. First, COMAL has many more commands; as you learn them, programming gets easier and easier. Second, COMAL is designed for structured programming, which BASIC allows but does not promote. Third, *The COMAL Handbook* lists 32 BASIC keywords that are implemented differently in COMAL. Fourth, your BASIC programs will not run under COMAL, but if they are well-designed, they will often be easy to convert.

[Editor's Note: The Group has just released several new books, and rereleased a few old titles, in looseleaf format at reduced prices. These include *COMAL Cross-Reference* (comparing different implementations of COMAL), *COMAL Collage* (a graphics and sprites tutorial), *3 Programs in Detail* (a guide to *Blackbook, Home Accountant,* and *BBS*), *Today Tutorials,* and *Today Tips and Notes* (both compiled from the newsletter).]

Reader Service No. 237



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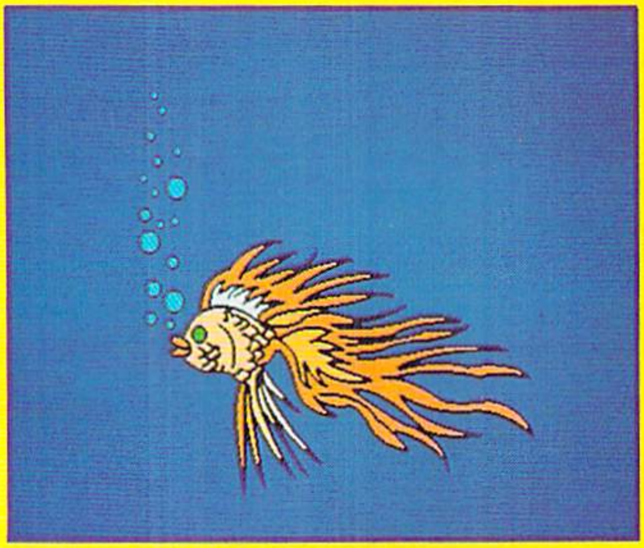
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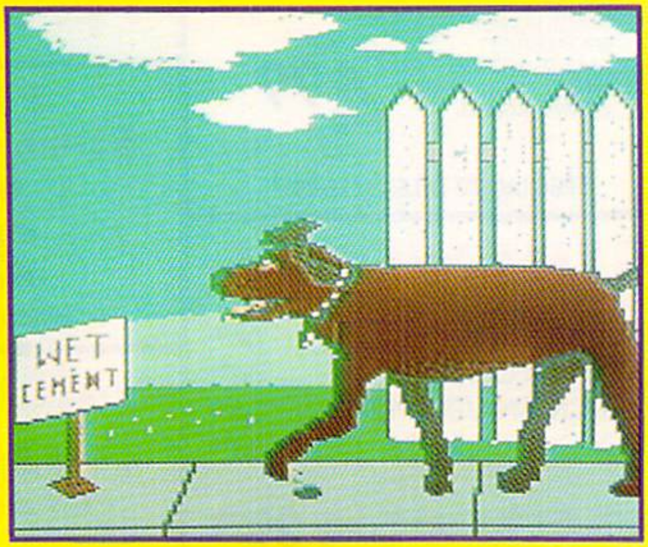


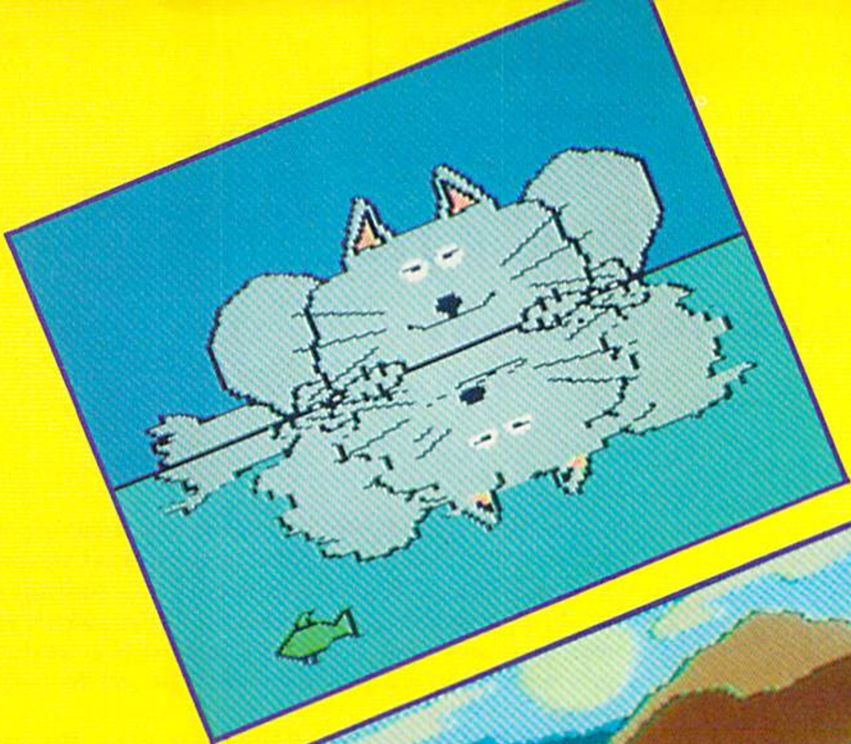
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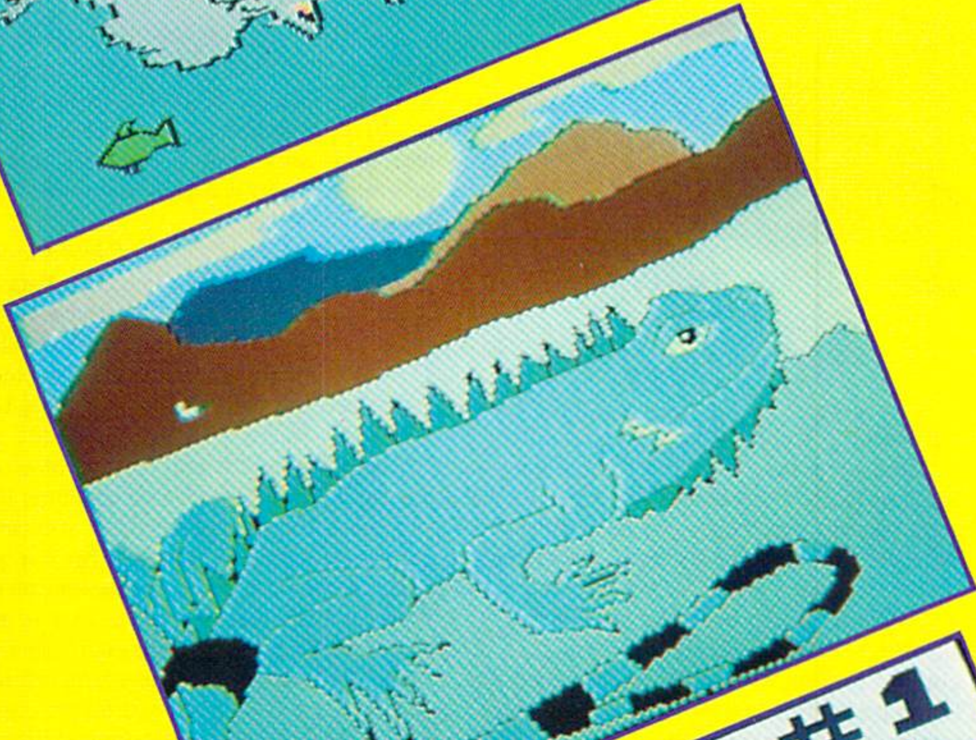
The *Ahoy! Art Gallery* offers the opportunity for fame and fortune to any and all aspiring Commodore artists. Simply send Morton (see address above) your work on disk indicating the drawing package or file format of the images. Inclusion of a self-addressed post card will guarantee an immediate response. All graphics produced on the C-64/C-128, Plus/4, and Amiga computers are eligible. In exchange your work will receive the opportunity for display in these pages. All published works will receive royalties based on the monthly *Art Gallery* disk sales. In addition, both published and unpublished images may be included on the various *Art Gallery* collection disks.

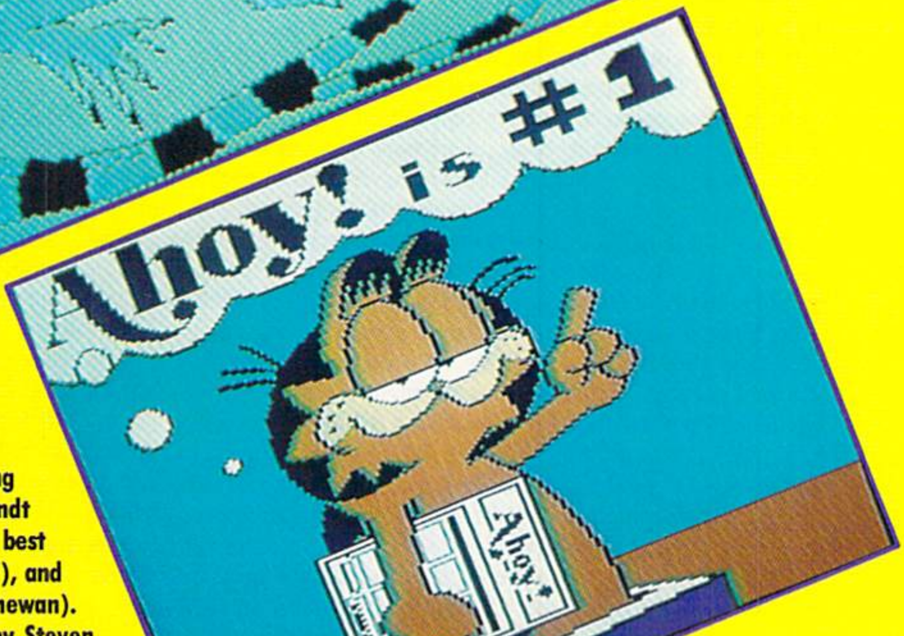
Note that the *Art Gallery* is not a contest. Published pictures are selected in an arbitrary and capricious fashion by the *Ahoy!* Art Director based solely on the artistic merit of the individual images.









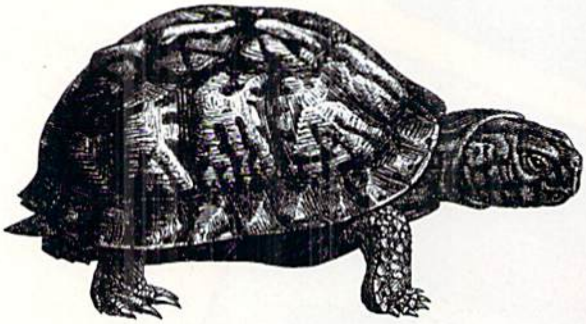


Can't decide whether to go lowbrow or highbrow today? We offer the perfect solution—combining a trip to the *Art Gallery* with a trip to the zoo. *Fishy* at extreme lower left was drawn to scale by Bruce Yarbor (Oklahoma City, OK) on *Deluxe Paint.* The stack of three on the facing page consists of *Mouse* by Marcy Willbrandt (Battle Creek, MI), *Caveman* (and caveman's best friend?) by Michael Montauck (Brooklyn, NY), and *Butch* by Daryl Maksymec (Regina, Saskatchewan). Top to bottom on this page are *Pusstata* by Steven Sellors (Saint John, New Brunswick), *Gecko Lizard* by Robert Tiess (Middletown, NY), and *Garfield*, a cat of obviously discriminating tastes, by Rod Robbins (Chatsworth, CA). All creatures great and small were drawn in everpopular *Koala* format with the single exception noted.

JAM ATTACK

For the C-64 and C-128

By Buck Childress



I've been jammed! And I took it like a r-e-a-l man. I cried, pulled some hair out, and tried clinging to the ceiling. It really didn't help much, though. The crying got my shirt wet, which gave me a chill. Pulling my hair out resulted in a splitting headache. And I quickly realized that if I continued acting as my own hair stylist, I'd soon resemble a billiard ball. The laws of gravity took immediate exception to my attempted walk on the ceiling. Since I couldn't flap my arms fast enough, I fell like a rock. As I lay on the floor, much like a turtle on its back, waiting for someone to come by and roll me over, a thought wandered into my aching head...there must be a way to avoid the jams. If there is, maybe I'll never have to give another demonstration of my terrific self control.

What is a jam? Well, it kind of resembles trying to stuff an elephant into a bird cage. In my case, I was unknowingly trying to save a 65 block program on a disk with 11 blocks free. Since it was 2:00 a.m. and my eyelids were beginning to feel as though the U.S. Navy were using them for anchors, I decided to pack it in for the night. I began tidying up the office while the ill-fated save was in progress. About the time I had everything in order the disk drive shut off. Great, now I could hit the sack. I turned around, put my finger on the computer's on/off switch, and began applying pressure just as my eye caught the blinking light on the drive. Too late...my reflexes aren't what they used to be. Off went the computer, off went my program, and off went my self control. When I regained my composure, I checked the directory. It proudly displayed the program name and that it was zero blocks long. The blocks free were also zero. Oh happy days! Could I possibly recover my lost jewel? No way! It had just passed Neptune, headed for Pluto, traveling at warp 10. I'll never see it again. This meant war! This meant *Jam Attack!*

Jam Attack defends you from the jams. It keeps you informed of the block length of your program before you save it. It also displays the blocks free on the disk currently in the drive. In addition, you can check the drive status if you need to. It works with both BASIC and machine language programs. There is a version for the C-64 and the C-128. Here's how to use it.

After you've saved a copy of *Jam Attack*, run it. The loader POKEs the machine language data into memory and checks for errors. When the data is through loading, you can activate it. For the C-64 type SYS 52000 and press RETURN. For the C-128 type SYS 4864 and press RETURN. You deactivate it the same way. This is called toggling.

Let's say you're working on a BASIC program and want to check its block length and the blocks free on the disk. Just press the EQUALS (=) key, then RETURN. *Jam Attack* gives you the rundown, so you can plan your attack against the jams accordingly. This is a quick and easy way to check the blocks free whenever you've made a save or swapped disks. And it's just as easy to get the block count if you've added lines to or deleted lines from your program.

You don't have to check anything before you make a save, though. So don't panic if you forget. *Jam Attack* automatically displays the block length and blocks free before any save is made. It asks if you want to proceed. If you do, the save is made. If not, *Jam Attack* cancels it. If you're using the C-128, *Jam Attack* works equally well with SAVE, DSAVE, and BSAVE.

Jam Attack can check the drive status should you encounter a blinking light. Press the AT (@) key, then RETURN. The status is given and the light takes a hike.

If you happen to be saving a program from within a monitor, the save feature works just like it does in BASIC. You'll get the block count, blocks free report, and the option of proceeding or putting on the skids. Because of the way monitors input your instructions, the EQUALS and AT keys only work from BASIC.

Jam Attack verifies that the disk drive is on before it performs any of its functions. If it's not you'll see:

```
?DEVICE NOT PRESENT ERROR
```

This prevents the computer from doing a nose dive when it tries to access a routine that requires the drive to be on.

Give *Jam Attack* a whirl. Keep those jams where they belong...in a sandwich, not on your disk. ☐

SEE PROGRAM LISTINGS ON PAGE 102

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C-64 RAMDrive

By Anthony Bertram

Commodore's 1764 RAM Expansion is now available, and many 64 owners are probably not sure what it can do for them. The extra RAM will not be accessible for running programs but will function as a RAM disk, a large chunk of random access memory used for temporary storage. The advantage of a RAM disk is speed: programs and data can be loaded and saved almost instantly. The disadvantage is that RAM disks can only store data while the power is on.

64 RAMDrive simulates a RAM disk and gives C-64 owners the chance to try some of the major features on the unexpanded 64. It can store a maximum of 12 programs (sequential and relative files are not supported), has a storage capacity of 23,551 bytes (92 blocks), and lets the user SAVE, LOAD, SCRATCH, and view the DIRECTORY.

The following commands are added to BASIC. All are preceded by the back arrow symbol and all except the Directory command require a six character filename enclosed in quotes:

←LOAD"FILNAM"	LOAD a file
←SAVE"FILNAM"	SAVE a file
←!"FILNAM"	SCRATCH a file
←$	View DIRECTORY

The load command loads into the start of BASIC memory, even if it has been moved up. In direct mode it will set the start of variables to its end. In program mode it will start to run without disturbing any variables left in memory by the program which loaded it.

The save command works like a normal SAVE of a BASIC program: it uses the start of BASIC (43/44) and start of variables (45/46) pointers to find the start and end of the program to be saved.

The scratch command erases only the program specified.

The directory command clears the screen and prints a list of the files in RAM storage.

All the commands will work within BASIC programs, so it's possible to have up to 12 programs sharing the same variables and loading one another as necessary. The new commands should be preceded by a colon if used in an IF/THEN statement, or a SYNTAX ERROR will occur. In DIRECT MODE more than one command can be entered, for example: ← $:LIST or ←LOAD"FILENAM":RUN.

64 RAMDrive uses the following error messages:

?MISSING FILENAME: There must be a six character filename in quotes; no graphics or control characters.

?FILE NOT FOUND: The program is not in the *RAMDrive;* check your spelling or the directory.

?FILE OPEN: The filename is already being used.

?TOO MANY FILES: Either the disk or the directory are full.

These error messages are "borrowed" from BASIC, so they will only have the above meanings when using one of the new commands.

COMPATIBILITY

64 RAMDrive is primarily for use with BASIC programs and machine language source code, although it does reside well with some machine language programs: *METABASIC, PAL, Power,* and *Supermon* for example. It uses the RAM under the ROM chips, from 40961 ($A001) to 64512 ($FC00), for program storage. The RAM from 64513 ($FC01) to 65535 ($FFFF) and 150 bytes in either the cassette buffer or the top of BASIC RAM is used for its code and the directory.

The BASIC loader program offers a configuration menu which allows the user to set up the *RAMDrive* program to suit his or her needs. The ML is in the form of data and can be relocated in either the cassette buffer or the top of BASIC RAM. There is a choice of two storage area sizes, the full 92 blocks or 44 blocks (11,264 bytes) with the storage starting at 53248 ($D000) leaving 40961 to 53247 for machine language, high-resolution screens, or RAM-resident BASIC. Programs that use the RAM under the Kernal ROM or Input/Output chips will not be compatible. The back arrow character can be changed to a number symbol for compatibility with the *Fast Load* cartridge from Epyx.

USING IT

Loading, running, and working on small to medium sized BASIC programs is made easy when programs of up to 92 blocks can be saved and loaded in one second or less. Tape users especially could benefit. With a total storage of 61K, including BASIC RAM, copying programs is made easy. It's possible to write programs in modular form, chaining the modules in from the *RAMDrive,* leaving a larger storage area available for variables while dispensing with waiting for the disk drive.

Saving programs from the *RAMDrive* to tape or disk can be done with a single line command, for example:

```
#LOAD"PRGRM1":SAVE"PROGRAM 1",8
```

SEE PROGRAM LISTING ON PAGE 104

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HOTFOOT

For the C-64

By John Krutch

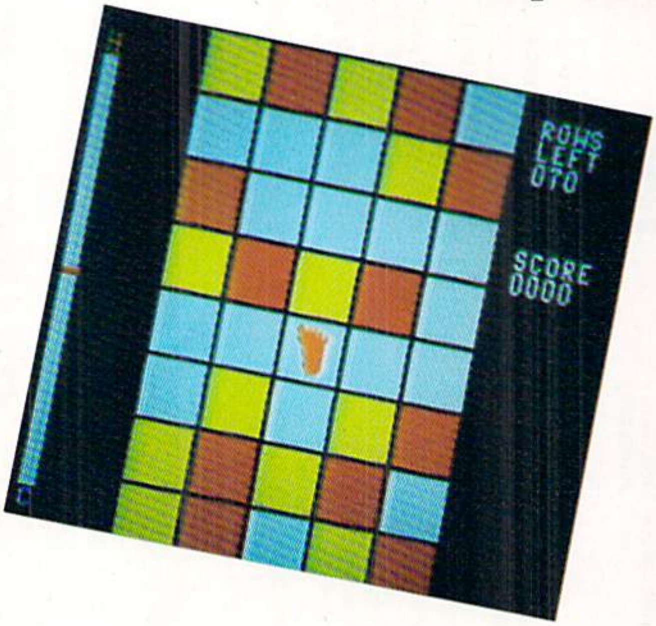


PHOTO: MICHAEL R. DAVILA

You are vacationing on a far away planet with a strange sounding name when disaster strikes. In a public place, you take an action which seems innocent enough to you – but the to the natives you appear to be committing an unspeakable blasphemy against their religion. Outraged, the natives seize you and throw you in jail.

You are offered a choice of two punishments: either you must undergo the hotfoot torture, or you must watch 100 consecutive episodes of *Wheel of Fortune.* Being of sound and sane mind, you immediately decide on the hotfoot torture, even though you're not quite sure what it entails.

You soon find out. Barefoot, you must hop on one foot over a series of tiles. Each tile is either white, yellow or red, indicating the temperature of the tile. A white tile is cool; when you hop on it your foot isn't harmed. A yellow tile is warmer but not dangerously so; when you land on it your foot will sustain only minor injury. A red tile is dangerously hot. When you land on a red tile, your foot will sustain serious injury.

As you hop through the tiles, you can monitor the temperature of your foot by watching the thermometer to the left of the screen. When your foot comes in contact with a yellow tile, the thermometer indicator will rise one notch. When it comes in contact with a red tile, the indicator will rise six notches. Avoid red tiles whenever you can! When the indicator rises all the way to the top of the thermometer, your foot is so badly burned that you can't go on, and the game is over.

You score one point for each row of tiles you pass. At the start of the game, you must hop your way through 70 rows of tiles, all of them randomly changing temperature. If you should make it all the way to the last row of tiles before your foot burns up, you're allowed to rest until your foot cools back to normal. Then you're forced to start over again – but this time you must make your way through an additional seven rows of tiles. Moral: don't blaspheme alien religions.

Hotfoot is a game for the Commodore 64. A joystick must be plugged into Port 2. Push the joystick left, right, up, or down to move the foot in the corresponding direction.

Flankspeed (page 95) is required to enter *Hotfoot.* To load *Hotfoot*, type LOAD "filename",8,1 (disk) or LOAD "filename",1,1 (tape). Then type SYS 49152 to start the program.

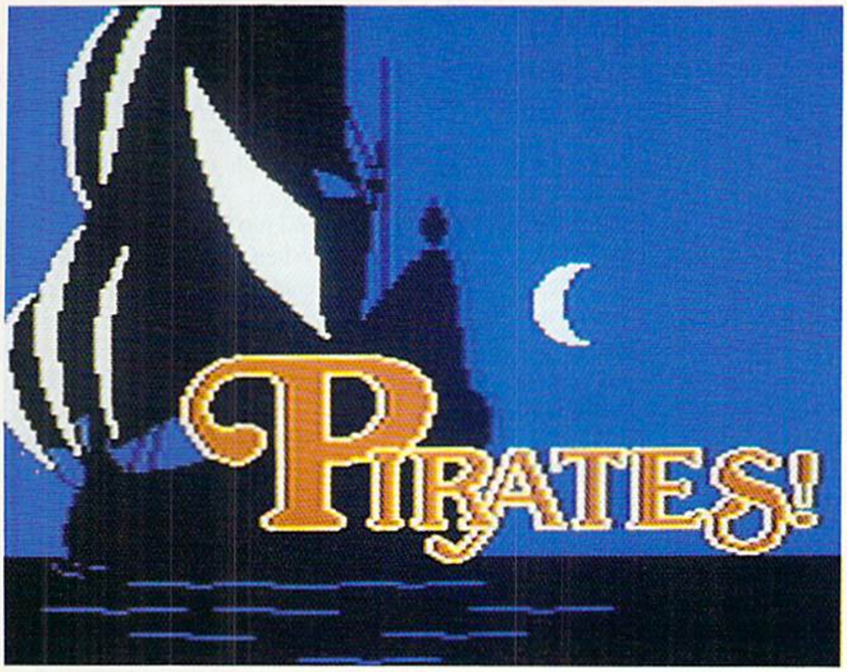
SEE PROGRAM LISTING ON PAGE 110

Featured This Month:

Pirates 41

Dan Dare, Pilot of the Future 42

The Sentry.................. 44



Swordfighting skill, seafaring ability, and business sense are required to earn your buccaneer an early retirement. *READER SERVICE NO. 223*



Some days, it just doesn't pay to get out of your dank, rat-infested berth.

PIRATES
MicroProse
Commodore 64
Disk; $39.95

Clench your dagger between your teeth, set your hat at a rakish angle, and cast off for the uncharted waters of seafaring adventure with super-designer Sid Meier. Best-known for his outstanding work on flying simulations and wargames, Meier demonstrates awesome versatility with this challenging action-strategy game about buccaneering in the Caribbean in the 17th century.

Those who think of the phrase "role-playing" as inevitably preceded by the adjective "fantasy" will find *Pirates* an eye-opener. This is a complete gaming system which allows the solitaire player to vicariously experience pirate life to the full.

Although Meier includes sequences for sailing and swordfighting, *Pirates* isn't just an arcade contest. Even these action-oriented interludes place a greater demand on fast thinking than on rapid reflexes.

It takes real skill to steer ships, particularly when the wind swings around to an inconvenient direction. The computer provides lots of assistance with seamanship at the easiest difficulty setting ("Apprentice"), but offers no crutch when difficulty is raised to the limit ("Swashbuckler").

Swordplay, too, requires more thinking than is obvious at first. It differs from most other hand-to-hand fighting games in that the gamer orders combinations of moves, rather than specific strokes. This makes the battles seem less chaotic and makes them more fun to watch.

The game gives a choice of three blades: the rapier, the cutlass, and the longsword. Each has unique characteristics and requires a specific approach. The documentation counsels newcomers to begin by wielding a cutlass, because of its hitting power, before advancing to the more demanding rapier.

A few "mini-game" scenarios simulate a single famous raid from the pages of history, but *Pirates* is primarily a campaign game. The computerist picks a time period, difficulty level, nationality, and a special skill such as fencing ability or medical knowledge. By guiding the character through a series of episodes, which can be saved to disk, the gamer helps him prepare for a sumptuous retirement. The more money, lands, and honors the buccaneer accumulates, the higher his estate in life once he abandons his nautical career.

The game system is visually interesting and fairly easy to manipulate. Decisions are facilitated by onscreen menus, and the action segments operate with joystick order-entry.

MicroProse's long experience with explaining fairly complicated programs to gamers stands the company in good stead here. The 90-page book included with *Pirates* provides a thorough explanation of every phase of activity as well as cogent historical notes which establish a rich context for the game-action.

Pirates is an unusual game, a breed apart from the fantasy quests and hard-boiled detective stories which have dominated computer adventuring for the last two years. Dare to be differ-



Some of Pirates' *places and faces.*

ent: *Pirates* is a computer gaming experience which should not be missed.

MicroProse, 120 Lakefront Dr., Hunt Valley, MD 21030 (phone: 301-771-1151). *—Arnie Katz*

DAN DARE, PILOT OF THE FUTURE

Amazing Software/Electronic Arts
Commodore 64
Disk; $19.95

The solo adventurer must analyze and solve a series of physical puzzles to guide the hero through a four-phase plot in *Dan Dare, Pilot of the Future*. Applying the same powers of observation to the product itself suggests that the saying "you can't tell a book by its cover" is not as true for software as for printed matter.

No one who carefully studies the cover could possibly be surprised by *Dan Dare, Pilot of the Future.* The album-style package reveals, albeit inadvertently at times, a great deal about the program it contains.

The prominent starburst blurb suggests much of both the good and the bad with its four fateful words: "England's #1 software hit!" Veteran computer gamers can easily guess that *Dan Dare* is a typical British "top 40" hit. And that, as all familiar with U.K. software know, means yet another beautifully programmed permutation of *Impossible Mission* (Epyx).

It also explains why Electronic Arts, which recently started the Amazing Software budget brand, would base a whole game on a comic book character who is totally unknown to 99% of Americans. Publishers adore proven sellers, no matter how, where, and why they succeeded.

Fortunately, *Dan Dare* is a delightful joystick-operated graphics adventure. Even those who can't appreciate the detailed simulation of the science fiction comic will enjoy the fast-paced action, challenging situations, and charming artwork.

Of course, some of the nuances fly right over the heads of U.S. players. True fans of Frank Hampson's character will marvel over Stripey, Dan's alien pet. Excellent artificial intelligence keeps this charmingly animated little creature ceaselessly following in the futuristic hero's wake. For most stateside computerists, though, it is "merely" an unusual and charming game-element of no special significance.

A television show about Space Fleet Captain Dan Dare ends on a sour note when Mekon, his old enemy, sends an asteroid with an atomic bomb hurtling toward the Earth. Failure to meet his demands spells certain doom for the entire planet.

Dan and his friends rocket to the asteroid. When they separate to explore, Mekon captures Professor Peabody and Digby.

As the interactive portion of the game begins, Dan and the faithful Stripey must search the rocky surface to find entrances to the subterranean complex. Once underground, the hero tries to rescue his two friends from the prison complex, fire a laser which destroys the asteroid's computer guidance system, and lob one of his grenades at Mekon's control dome.

Treen warriors, minions of the Green Fiend, patrol the passages which honeycomb the asteroid. Hand-to-hand combat is the only way to get rid of these defenders, and some of them aren't especially easy to kill.

The gamer does everything with the joystick. When Dan Dare moves close to an object, a message in the lower left corner explains the situation. The user holds down the action button and moves the stick to toggle among a set of windows. Each represents one possible course of action. Releasing the button implements the visible window.

The joystick also controls Dan dur-



The tunnels and other background features in Dan Dare *appear flat compared to the foreground graphics. Dan and the other characters are colorful, detailed, and well-animated.* READER SERVICE NO. 224

ing fight sequences. Holding the button while pushing the joystick forward causes Dan to aim a blow at the Treen's head, while pulling it back orders a body punch.

Grenades are Dan Dare's most powerful weapon. Holding the button and pointing the stick makes him toss one in the indicated direction. The supply is limited, however, and it takes quite a few to destroy Mekon's dome.

The foreground graphics are superior to the rather flat depiction of the tunnels and other background features. Dan, Stripey, and other characters, though shown in simple side perspective, are colorful, detailed, and very well animated.

The boxing sequences aren't convincing. The arms are too short to move realistically, so fights do not have the balletic grace of a Jack Kirby punch-up.

Dan Dare, Pilot of the Future is the first title in the Amazing Software line. It is a fast-paced, playable game at a reasonable price. The theme is not as accessible as some to the American audience, but it's hard to resist such a charming action adventure program.

Electronic Arts, 1820 Gateway Dr., San Mateo, CA 94404 (phone: 415-571-7171). *–Arnie Katz*

THE SENTRY
Firebird
Commodore 64
Disk; $39.95

Get ready for another blockbuster from the publishers of *Elite*. *The Sentry* is a strategic contest with science fiction overtones, lots of visuals, and almost unlimited play potential thanks to its 10,000 racks, or "landscapes."

A sort of three-dimensional chess game, *The Sentry* begins when the player selects one of the 10,000 landscapes. (A special rack makes the game easier for first-timers.) The computer produces a two-thirds aerial display and gives the player a chance to study the board before teleporting into a robot on the landscape's surface.

The player now sees a robot's eye-view of the surface, and must wage a battle of wits with the current occupying force, the Sentry and its minions (Landgazers and Meanies). The basic currency of this conflict is energy. Each landscape contains a fixed amount of energy, displayed in terms of trees (1 unit) and boulders (2 units). Robots are worth 3 units and the Golden Robot (the one being occupied by the player) is worth a whopping 15. The player can use the robot's ability to absorb and redistribute energy to arrange the landscape in a more favorable alignment.

For example, the player could absorb a boulder and create two trees (good for obscuring one's position from the Sentry and Landgazers); or absorb four trees and create two boulders (which can be stacked, and a robot placed atop them to obtain a better view of some object on the landscape). The trick: to absorb an object's energy, the player must be able to fix his robot's sights directly on the square it occupies.

A landscape can be conquered by absorbing its Sentry, but to do that, the player's robot must be able to see it. The Sentry and its thugs, meanwhile, are looking to absorb you, and any movement or action (other than simple panning) gives away your position. Of course, they too must be able to see not only you (a half-scan) but the square you occupy (a full-scan). When the Sentry can only obtain a half-scan, it sends out its Meanies to flush you into a more vulnerable position.

To beat the Meanies at their own game, the player must "hyperspace," that is, create a new robot in a random position on the landscape and automatically transfer the player's consciousness to it, leaving the shell of the old robot behind. While the Meanie focuses on the shell, the player can absorb it from his new position.

The Sentry is just loaded with this sort of strategic nuance. It's the kind of game that engenders a devoted cult following, and it would not be surprising (or unwelcome) to see Sentry tournaments springing up. The graphics, while hardly of coin-op quality, are rather compelling and quite adequate to the task. *The Sentry* is an instant classic, an innovative blend of strategy and action ("straction"?) that should stir the blood of any game-player.

Firebird Licensees, P.O. Box 49, Ramsey, NJ 07446 (phone: 201-444-5700). *–Bill Kunkel*

Most back issues of *Ahoy!* are available at $4.00 each. See page 62.

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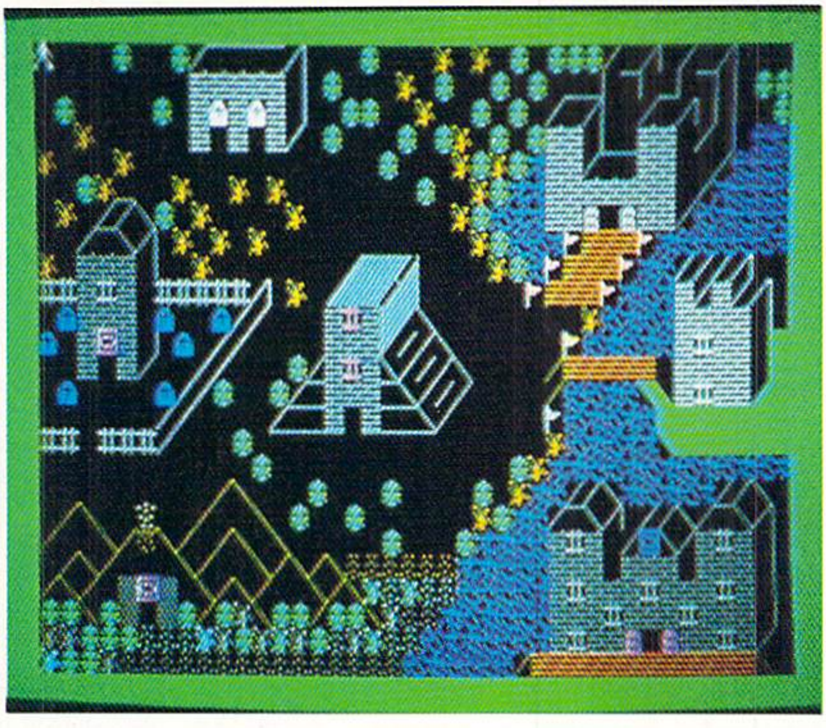
This game is really bizarre and a heckuva lot of fun. It's like "Lord of the Rings" and "Monopoly" mixed together in one big smelting pot. It's also the sort of game you'll only see in the pages of *Ahoy!*, because it's a real change of pace from "kill the monster, get the treasure" type adventure scenarios. You may find it an unsettling course in economics as well. I admit this game is a result of some reading I have been doing lately in that field.

Originally these graphics were part of a C-64 game I was working on that was intended for commercial publication. But that project, called *Adventuron*, grew too similar to other games of its ilk and I scratched it in favor of this game. The result is a very aesthetically pleasing blend of text and graphics.

The setting for the game is a huge map of the world of *Empire*, a fantasy never-never land. This map contains the kingdoms of eight different warring factions.



Each of the kingdoms comprising the* Empire *has its own entrance. Once inside, you'll get a menu of options; pick Buy or Sell, and you'll see the menu above.



You will be in the middle of this war and attempt to profit from it, because you are a traveling merchant.

The goal of the game is to acquire 100% of the Empire within one year. Each kingdom owns a separate portion of the Empire, and you will attempt to buy out their land shares with the profits you'll make wheeling and dealing in the various population centers.

To move around on the master map, you'll need a joystick plugged into Port 2. You can move anywhere you want in the Empire, including across bodies of water or rough mountainous terrain. Your little man will change to a figure on a horse or in a canoe when you cross either of these.

Each kingdom has an entrance. To enter the kingdom, move your man to this doorway and squeeze the fire button.

The screen will present a menu of options once inside:

Buy
Sell
Seasonal Changes
Inquire
Inventory
Bid Farewell

From this menu you can select any option by moving the highlighted bar with the joystick and pressing the fire button.

If you select Buy or Sell, you'll be able to purchase goods with the $500 starting money you're given. You also have $5000 worth of credit extended to you by the Merchant's Guild in the form of debt notes. You cannot purchase land with debt notes, but you can buy goods to sell for profit, if you deal wisely to recover your losses.

There are nine types of trade commerce in the Empire:

1. Artifacts (religious items, antiques)
2. Weapons (swords, spears)
3. Armor
4. Rare Metals (gold, silver)
5. Horses
6. Slaves
7. Food Products (grain, rice, corn, etc.)
8. Fabrics (clothing, drapes)
9. Land Shares (deeds to individual furlongs)

Your year of trading is divided into four separate seasons. Each of these seasons is denoted by a change in the border color of the map: green for spring, yellow for sum-

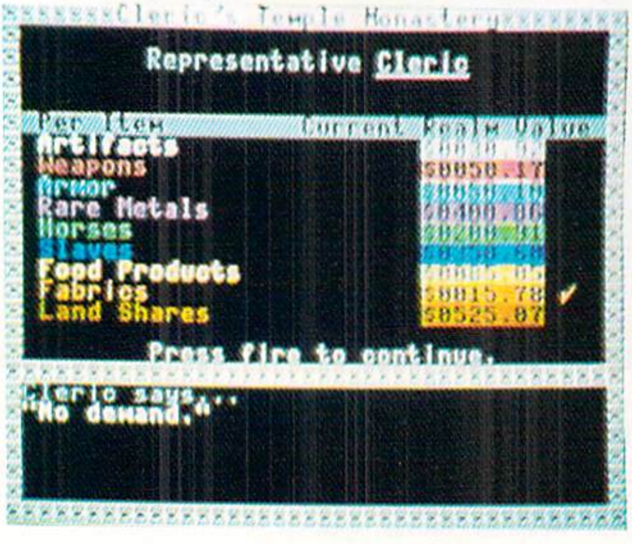


Don't bargain so long that the Monk quits in frustration.

mer, brown for fall, and white for winter.

The Merchant's Guild fixes prices for each of the eight goods above quarterly. Each of these set prices is modified by different seasons of the year; for example, food products are in high demand during the winter, along with fabrics, because of the cold and starvation that occurs at this time of year. Because the products are in greater demand, people will pay higher prices for them. If you buy up these products during the summer (when they are cheap) and hoard them until winter, you can sell them at tremendous profits.

By selecting seasonal changes from the menu, you can see the gains or losses experienced each season for the product and adjust your purchases to benefit the most from this knowledge.



There are nine different types of commerce in the Empire.

The kingdoms each have different needs for the products, and you may get more than the base price set by the Guild if you are a clever bargainer. Your goal, of course, is to buy the products at the lowest possible price and sell them for the most you can get.

You'll still use the joystick for numeric input. Up and down will decrement or increment the numbers by tens respectively, and left and right decrease or increase the numbers by ones. Push the fire button to enter your offer.

Each kingdom makes its own individual product, so it will have no need to purchase any from you. However, each kingdom is the only source for the product it turns out, and you will have to find out through deduction and trial and error which product that is. Selecting Inquire from the menu will inform you of the current demand for the product in that particular kingdom, and the base price set for it by the Guild. Once you find out what product the inhabitants deal in, you will want to hornswoggle them down to the lowest price you can. Their first selling offer will be ridiculously high, of course—but you can bring this price down by carefully bidding close (not too close, though).

For example, if the Monk offers to sell you 110 fabrics at $95 apiece (base price $40), offer him $85 instead. If he comes down a little, try to give him $69 apiece. The goal is to bicker him down to less than $40, the base price, while he curses and remonstrates against your tightfistedness. If you manage to get him below $25, you can resell the goods to another kingdom where they are in high demand at an enormous profit. Be careful not to bargain too long with him, or he will utter a snarl and break off from negotiations altogether in frustration.

To sell your wares, you will want to bid close to his first low offer, then slowly nudge the price up (complaining of your overhead and expenses) until you lure his offer up past the base price and into the big bucks take-the-money-and-run regions.

The Inventory command shows you how much of each product you are carrying and how much cash you have on hand, if you should forget.

To leave the location you are currently in, select Bid Farewell from the menu. You will be back outside, on the master map. You cannot enter that kingdom again until you have visited at least one other.

You will probably spend the spring in debt, but come summer it will be time to start thinking about buying some land. Hopefully you will be out of debt and have lots of capital by this time, so you should start acquiring some property.

If you play with great cunning, you may own all or almost all of the Empire by the time the end of the year rolls around, which takes anywhere from 20 to 30 minutes of gameplay in real world time. The ecological clock stops dead while you are inside the kingdoms, so this could vary greatly from session to session.

At the end of winter, your inventory board will appear, along with your current cash holdings, and the percentage of the Empire you own at year's close.

The listing is in BASIC 7.0 and uses some really keen character animation to make the Empire oceans shimmer, flags wave in the breeze, and volcanoes erupt. Be sure to save a copy of the program before running it, however, since it uses a small machine language subroutine to copy the character data down to the graphics screen.

Good luck. The unwashed masses are hungrily awaiting your visit to their kingdom! ☐

SEE PROGRAM LISTING ON PAGE 106

TIPS AHOY!

Compiled by Michael R. Davila

Contributors to *Tips Ahoy!* will be compensated at highly competitive industry rates immediately upon acceptance. Send your best programming and hardware hints to *Tips Ahoy!*, c/o Ion International Inc., 45 West 34th Street, New York, NY 10001. Include a stamped and self-addressed envelope if you want your submissions returned.

PHASE-IN

Phase-In is a short relocatable machine language program for the C-64 and C-128 that causes a rippling effect on the high resolution bit mapped display. I tried to make the program as flexible as possible. To relocate the machine language routine, simply set variable S in line 2 to the new location. Those of you who wish to relocate the bit map display must change the value of variable BM in line 3 to the new starting location.

—Michael Jaecks
Alamogordo, NM

```
•1 REM PHASE-IN
•2 S=4864:REM START ADDR. FOR ML STORAGE
•3 BM=8192:REM START ADDR. OF BIT MAP
•4 FORI=0TO59:READA:POKES+I,A:B=B+A:NEXT
•5 IFB<>9091THENPRINT"ERROR IN DATA STATE
MENTS!":END
•6 HI=INT(BM/256):POKES+3,BM-HI*256:POKES
+7,HI:BM=BM+7999:HI=INT(BM/256)
•7 POKES+47,BM-HI*256:POKES+53,HI
•8 PRINT:PRINT"SYS"S"TO ACTIVATE"
•10 DATA 162,8,169,0,133,251,169,32,133
•20 DATA 252,160,0,177,251,72,160,7,177
•30 DATA 251,72,136,208,250,160,0,104
•40 DATA 145,251,200,192,8,208,248,165
•50 DATA 251,24,105,8,133,251,144,2,230
•60 DATA 252,165,251,201,63,144,216,165
•70 DATA 252,201,63,144,210,202,208,199
•80 DATA 96
```

READY OR NOT

Ever spend hours writing or debugging a program? At those times it seems the only thing you can be sure of is the READY prompt staring you in the face. Wouldn't it be nice if it could say something else? Maybe RELAX!

With *Ready or Not* you can change the READY prompt to whatever you like, up to six characters in length. Change it to your name or to a design using the keyboard graphics. I like to press (CTRL 8) BUCK (CTRL 1). Then, instead of READY, my name is displayed in yellow and whatever I type is printed in black. You can have your customized prompt displayed in reverse video (CTRL 9), also. If you're the generic type that likes plain brown wrapper, how about changing it to PROMPT?

After saving *Ready or Not*, you can load and run it like any other program. The BASIC loader POKEs the machine language data into memory and checks for errors. You can then activate it by typing SYS 53000 and pressing RETURN. READY. will appear on your screen (as a six character guideline, counting the period) with the cursor below it. Enter your name, or whatever, hit RETURN, and presto! (If you make a mistake, press INST/DEL.) Your customized prompt has replaced READY. SYS 53000 anytime you want to change it.

Ready or Not can be relocated by changing S in line 2.

—Buck Childress
Salem, OR

```
•1 PRINTCHR$(147)"LOADING[3"."]":PRINT
•2 S=53000:REM *** CHANGE S TO RELOCATE *
**
•3 FORJ=STOS+119:READA:POKEJ,A:X=X+A:NEXT
J
•4 IFX<>18560THENPRINT"ERROR IN DATA[3"."
]":END
•5 PRINT"THE DATA IS LOADED[3"."]":PRINT:
PRINT"SYS"S"TO CHANGE THE PROMPT[3"."]":
END
•6 DATA169,160,162,0,160,224,133,252,134,
251,132,254
•7 DATA161,251,129,251,230,251,208,248,23
0,252,200,208
•8 DATA243,162,55,208,64,32,68,229,169,11
8,160,163
•9 DATA32,30,171,169,32,162,5,157,120,163
,202,16
•10 DATA250,134,212,232,134,198,134,204,1
34,253,32,228
•11 DATA255,240,251,201,13,240,20,201,20,
240,210,166
•12 DATA253,224,6,176,237,157,120,163,32,
210,255,230
•13 DATA253,208,227,169,0,162,54,133,254,
169,47,120
•14 DATA133,0,134,1,88,169,32,32,210,255,
165,254
•15 DATA208,175,133,207,169,13,76,210,255
,0,0,0
```

H-ALT

H-ALT is a relocatable machine language utility for the C-128 that enables you to pause the computer's operating system. By hitting the ALT key, you can pause most functions enabled by the computer. However, I did not intend for this utility to replace the NO SCROLL key. When CATALOGing a disk, be sure to use the NO SCROLL key to pause. To continue the normal operations, simply hit any other key. Incorporating this utility in your games can make them even more enjoyable.

—Michael Jaecks
Alamogordo, NM

```
·1 REM H-ALT
·2 REM HIT THE ALT KEY TO PAUSE
·3 REM HIT ANY OTHER KEY TO CONTINUE
·10 S=4864
·20 FORI=0TO29:READA:POKES+I,A:B=B+A:NEXT
 I
·30 IFB<>3680THENPRINT"ERROR IN DATA STAT
 EMENTS!":END
·40 HI=INT((S+13)/256):LO=S+13-HI*256:POK
 ES+2,LO:POKES+7,HI
·50 PRINT"[CLEAR]SYS"S"TOENABLE":PRINT"HI
 T RUN/STOP AND RESTORE TO DISABLE"
·60 DATA 120,169,13,141,20,3,169,19,141
·70 DATA 21,3,88,96,169,8,197,211,208
·80 DATA 8,32,159,255,32,228,255,240,248
·90 DATA 76,101,250
```

DUO-PRINT

This handy little utility displays a hex dump of a given memory area. What makes this so special is that it doesn't waste paper as a 1 column printout would. It utilizes the far right side as well as the left side of the paper. This saves a lot of paper when making a hex dump. Just enter the starting and ending addresses (in decimal) when they're asked for. The computer will print out to the printer (device #4) in 2 columns. This saves time and paper. —John Fedor
Lindenhurst, IL

```
·5 H$="0123456789ABCDEF"
·10 INPUT"[CLEAR]ENTER STARTING ADDRESS "
 ;A1
·20 INPUT"[CLEAR]ENTER ENDING ADDRESS ";A
 2
·30 IFA2<A1THEN10
·40 S1=A1:S2=INT((A2+A1)/2)
·55 IFA1-INT(A1/8)*8<>S2-INT(S2/8)*8THENS
 2=S2+1:GOTO55
·60 E1=S2-1:E2=A2
·70 PRINT"[CLEAR]"
·75 OPEN4,4:CMD4
·80 IFS1>E1THENPRINTSPC(30);:GOTO95
·90 A=S1:GOSUB600:FORI=0TO7:A=PEEK(S1+I):
 GOSUB700:NEXTI
·95 PRINTSPC(10):IFS2>E2THEN110
·100 A=S2:GOSUB600:FORI=0TO7:A=PEEK(S2+I)
 :GOSUB700:NEXTI
·105 PRINT
·110 S1=S1+8:S2=S2+8
·115 IFS1<=E1ORS2<=E2THEN80
·120 PRINT#4,"":CLOSE 4:END
·599 REM
·600 C=INT(A/4096):PRINTMID$(H$,C+1,1);:A
 =A-4096*C
·605 C=INT(A/256):PRINTMID$(H$,C+1,1);:A=
 A-256*C:C=INT(A/16)
·610 PRINTMID$(H$,C+1,1);:A=A-16*C:PRINTM
 ID$(H$,A+1,1)": ";:RETURN
·700 C=INT(A/16)
·705 PRINTMID$(H$,C+1,1)MID$(H$,(AAND15)+
 1,1)" ";:RETURN
```

RADAR 128

This program for the 128 is a simulated naval radar which could be used in some kind of sub-based game. It uses one sprite for the blip. The routine first draws a circle the hard way in order to be able to store the points in an array for callback later. This program can easily be implemented into a program; for example, the program could control where the sub is and plot it on the radar easily by defining the variables, SA for the angle and SD for the distance from the boat or sub. The best speed at which the radar turns is between 10 and 20. Anything below 5 and it takes forever to go around. —William Eisenhauer
Beaverton, OR

```
·1 GOSUB26
·2 COLOR1,1:COLOR4,2:COLOR.,2
·3 SPRITE1,.,7:MOVSPR1,142,140
·4 SCNCLR:GRAPHIC1,1:GRAPHIC0,.
·5 INPUT"ENTER SPEED(1-SLOW 30-FAST):";SP
 :INPUT"ENTER SUB DISTANCE FROM CENTER";S
 D:INPUT"ENTER ANGLE (NORTH-0)";SA
·6 INPUT"ENTER RADAR SIZE";SZ
·7 MOVSPR1,SD;SA:REM SPOT SUB
·8 DIMX(360),Y(360)
·9 :
```

```
·10 REM DRAW RADAR FRAME
·11 :
·12 FORT=0TO360:LOCATE130,100
·13 DRAW0,SZ;T:X(T)=RDOT(0):Y(T)=RDOT(1)
·14 DRAW1
·15 NEXT:GRAPHIC1,.:CHAR1,14,1,"RADAR":DO
·16 :
·17 REM LOOP TO SPIN NEEDLE
·18 :
·19 FORT=0TO360STEPSP
·20 DRAW1,130,100TOX(T),Y(T)
·21 IF(T+SP>SA)AND(T-SP<SA)THENSOUND1,200
00,10,0,20000,2,0:SPRITE1,1,7:FORQ=1TO20
:NEXT:SPRITE1,0,7
·22 DRAW0,130,100TOX(T),Y(T):DRAW1,X(T),Y
(T):NEXT:LOOP
·23 :
·24 REM SUBROUTINE TO MAKE RADAR BLIP
·25 :
·26 FORG=3584TO3647:POKEG,0:NEXT:POKE3609
,24:POKE3612,60:POKE3615,60:POKE3618,24:
RETURN
```

BYTES 'R' US

When you eat a sandwich, you take bites. If you munch down some popcorn, you take bites. By the same token, when you enter a program, you take bytes. Let's face it, bites and bytes are a fact of life—*Bytes 'R' Us!* If, like me, you frequently like to know how much you're packing into Ol' Reliable's waistline, try *Bytes 'R' Us.*

Bytes 'R' Us instantly tells you the number of bytes your BASIC programs are taking. There's a version for the C-64 and C-128.

Just load and run *Bytes 'R' Us*. It will remain undisturbed in a free area of memory while you load, save, or work on your BASIC programs.

To use *Bytes 'R' Us*, type SYS 700 for the C-64 or SYS 3072 if you're on the C-128. Now press RETURN. Presto... you'll immediately see how much weight your masterpiece has gained or lost!

Both versions can easily be relocated if you want. All you have to do is change the variable S in line 2 to your new starting address. —Buck Childress
Salem, OR

C-64 VERSION

```
·1 REM *** BYTES 'R' US (64) ***
·2 S=700:REM CHANGE S TO RELOCATE
·3 PRINTCHR$(147):PRINT
·4 FORJ=STOS+23:READA:POKEJ,A:X=X+A:NEXTJ
·5 IFX<>3448THENPRINT"ERROR IN DATA[3"."]
":END
·6 PRINT"DATA OK.  SYS"S"FOR BYTES[3"."]"
:END
·7 DATA166,43,232,232,134,251,165,45,56,2
29,251,170
·8 DATA164,46,176,1,136,152,56,229,44,76,
205,189
```

C-128 VERSION

```
•1 REM *** BYTES 'R' US (128) ***
•2 S=3072:REM *** CHANGE S TO RELOCATE
•3 PRINTCHR$(147):PRINT
•4 FORJ=STOS+28:READA:POKEJ,A:X=X+A:NEXTJ
•5 IFX<>3513THENPRINT"ERROR IN DATA[3"."]
 ":END
•6 PRINT"DATA OK.  SYS"S"FOR BYTES[3"."]"
 :END
•7 DATA32,69,168,166,45,232,232,134,251,1
 73,16,18
•8 DATA56,229,251,170,172,17,18,176,1,136
 ,152,56
•9 DATA229,46,76,50,142
```

C-64 ALL-RAM SAVER

The RAM under the Kernal (57344-65535) is a good place to put any type of data like hi-res graphics, sprites, etc., because BASIC doesn't use it. But what happens if you want to save this memory? To read it you have to turn off the Kernal and therefore cannot use its save routine. None of the programs I know solve this problem either, so I wrote *All-RAM Saver*; it can save any of the 65536 RAM bytes of your computer to disk. To use it, type the program below and run it. To save any portion of RAM just type the following command:

```
SYS AD,"Filename,P,W",starting address o
f save,ending address of save
```

where AD is the machine language beginning address of *All-RAM Saver.* The default value is 828 but you can change it anywhere in memory by changing the value in line 10. *All-RAM Saver* is very similar to *Data Express* (July '87), so read the article to learn about uses of the program. As an example, suppose we want to save a hi-res graphic from *Simons' BASIC* (located under the Kernal) under the name of 'draw'. Enter:

```
SYS 828,"DRAW,P,W",57344,65535
```

To load it: LOAD "DRAW",8,1. —Christian Castor
Mexico City, Mexico

```
•10 AD=828:FOR A=AD TO AD+110:READ B:POKE
 A,B:CK=CK+B:NEXT
•11 IFCK<>15696THENPRINT"ERROR IN DATA":S
TOP
•12 DATA 032,253,174,032,087,226
•13 DATA 169,008,133,186,169,104
•14 DATA 133,185,032,213,243,165
•15 DATA 186,032,177,255,165,185
•16 DATA 032,147,255,032,253,174
•17 DATA 032,138,173,032,247,183
•18 DATA 165,020,133,251,032,168
•19 DATA 255,165,021,133,252,032
•20 DATA 168,255,032,253,174,032
•21 DATA 138,173,032,247,183,165
•22 DATA 001,072,165,020,072,166
•23 DATA 021,120,169,000,168,133
•24 DATA 001,177,251,160,055,132
•25 DATA 001,032,168,255,104,072
•26 DATA 197,251,208,004,228,252
•27 DATA 240,008,230,251,208,227
•28 DATA 230,252,208,223,104,104
•29 DATA 133,001,032,174,255,032
•30 DATA 066,246,096
```

TWO COLOR BORDER

Here's a program that lets you have a two-color border, split horizontally in the center. To change the colors just replace the second number in lines 80 and 90 with another number from 0 to 15. —Brian Ostergren
Madison, WI

```
•10 REM TWO COLOR BORDER
•20 FOR I=828 TO 892:READ A:POKEI,A:NEXT
•30 SYS828
•40 REM CHANGE THE SECOND NUMBERS IN LINE
S 80 AND 90 FOR DIFFERENT COLORS
•50 DATA 169,27,141,17,208,169,127,141,13
,220,169
•60 DATA 86,141,20,3,169,3,141,21,3,169,1
29
•70 DATA 141,26,208,96,169,1,141,25,208,1
```

Continued on page 114

AMIGA SECTION

EARL WEAVER BASEBALL
Electronic Arts
Amiga (512K)
Disk; $49.95

The most feature-laden computer baseball game ever coded raises a provocative question: Can a program attempt too much for its own good? *Earl Weaver Baseball* is an exceptionally fine product, but it's hard to shake the feeling that it would have been even better if author Eddie Dombrower hadn't tried to touch all the bases at once.

The World's Greatest Baseball Game (Epyx), designed by Quest, Inc., features an arcade contest and a statistical simulation in one package. Unfortunately, the limitations of eight-bit technology handicap both components of *World's Greatest* compared to more focused baseball games of the same period. The graphics pale beside *Star League Baseball* (Gamestar), while the mathematical model doesn't measure up to *Computer Baseball* (Strategic Simulations) in detail and complexity.

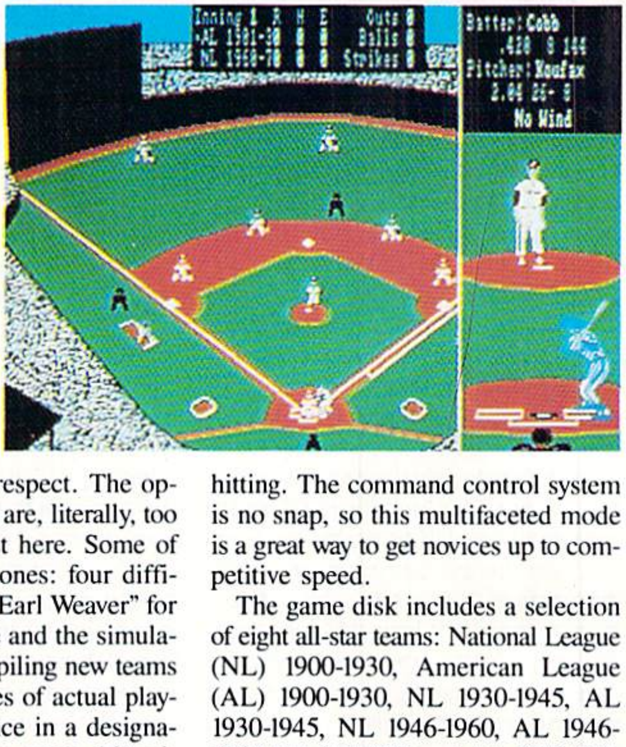
Earl Weaver Baseball is the best hybrid yet published for the home computer. It actually surpasses most of the currently available specialized action and statistical baseball programs.

Eddie Dombrower has done a magnificent job on *Earl Weaver Baseball*. He has integrated a lot of great manager's philosophy into this design, which gives it unmatched realism. Yet as with *World's Greatest Baseball Game*, combining action and stat applications forces some aesthetic compromises.

The graphics, which would be excellent for a statistical simulation, aren't quite as good as those found in state-of-the-art action games. Conversely, smoother play-mechanics and the inclusion of more teams on the game disk would enhance the stat simulation.

The key to controlling this multifaceted, flexible program is the main menu screen which replaces the beautiful title page after booting (Note: Amiga 1000 owners must have Kickstart 1.2.) The computerist employs mouse, joystick, or keyboard to quickly set the parameters. No game rivals *Earl Weaver Baseball* in this respect. The options and adjustments are, literally, too numerous even to list here. Some of the more interesting ones: four difficulty levels, a robot "Earl Weaver" for both the arcade game and the simulation, utilities for compiling new teams and leagues, databases of actual player stats or performance in a designated group of computer games, historical and customized stadiums, and a choice of pitch-by-pitch or at-bat summary play.





Author Eddie Dombrower, shown with diamond legend Earl Weaver, combined the best of action-oriented and statistic-based baseball games into an exceptionally fine product.
READER SERVICE NO. 255

For those who elect to concentrate on the arcade version, there's an excellent "practice" setup. Unlike most games, *Earl Weaver Baseball* provides more than just a batting cage. It is possible to hone skills in fielding, pitching, and even baserunning as well as hitting. The command control system is no snap, so this multifaceted mode is a great way to get novices up to competitive speed.

The game disk includes a selection of eight all-star teams: National League (NL) 1900-1930, American League (AL) 1900-1930, NL 1930-1945, AL 1930-1945, NL 1946-1960, AL 1946-1960, NL 1961-1975, and AL 1960-1975.

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Diga!..........................60

It's a good selection for those exclusively interested in old-timers, but the lack of contemporary teams is disappointing. The package includes a special offer for a discount on a disk based on the 1986 season.

The main display shows a view of the entire field with home plate near the bottom of the screen. A large window on the right, called up by clicking the mouse button, provides an umpire's view of the pitcher-batter confrontation. Pop-up windows allow both managers to position fielders, insert substitutes, visit the mound for a conference, consult statistics, and make other strategic moves.

The onscreen athletes, though a little small, are fluidly animated and look good going through their paces. Moreover, the reactions and movements of fielders, runners, and hitters are remarkably consistent with real-life major league action.

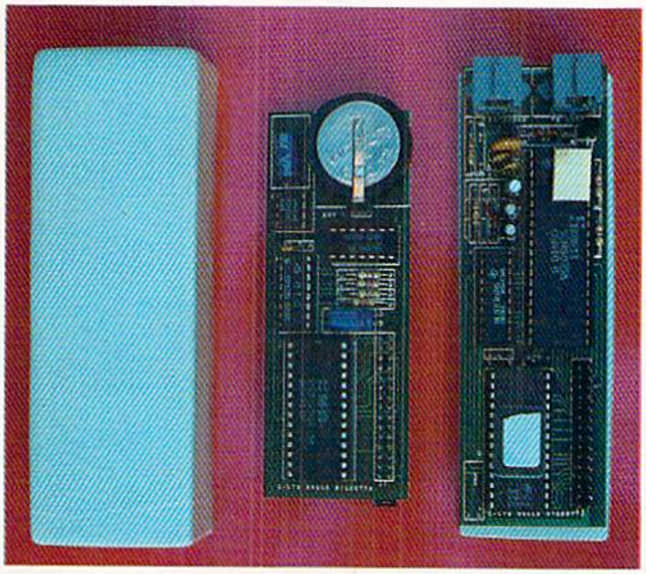
Video tricks spice up the graphic look of *Earl Weaver Baseball.* There are instant replays, slow-motion sequences, and even frame-by-frame review. The between-innings transition is absolutely marvelous. The picture shrinks somewhat and a list of batters coming up in the next half-inning appears against a black background in the lower right corner of the screen.

The audio is similarly sensational. Teri Moran, wife of the main designer, shows a real flare for music and sound effects. From the opening rendition of "Stars and Stripes Forever" which accompanies the loading procedure to the digitized voice which announces each batter, *Earl Weaver Baseball* really sounds like a day at the ballpark.

Could this product have turned out even better? Yes, it could have. Electronic Arts might have developed two separate games, one action and the other stat simulation, and pushed each to even greater heights.

The desire for the perfect program should not, however, blind lovers of the National Pastime to the merits of *Earl Weaver Baseball* as it stands. It may not be the last word in computer baseball, but it is currently the game against which all other electronic versions of the sport must be measured.

Electronic Arts, 1820 Gateway Dr., San Mateo, CA 94404 (phone: 415-571-7171). *—Arnie Katz & Bill Kunkel*



Inside the TimeSaver are a pair of piggy-backed circuit boards. Left to right: TimeSaver cover, top board with 3V Lithium battery, clock/calendar chip, 8K of RAM, and bottom board with microprocessor. *READER SERVICE NO. 227*

PHOTO BY MORTON KEVELSON

TIMESAVER
C Ltd
Amiga 1000
Price: $79.95

Its ten o'clock. Does your Amiga know what time it is? If not, maybe you should do something about it. TimeSaver from C Ltd may be just the thing to do it with.

All kidding aside, the correct time and date is an important matter as far as AmigaDOS is concerned. It is important enough that the default Startup-Sequence on the Workbench disk includes a message which reminds the user to enter the time and date via Preferences every time the Amiga boots up. The time and date information is used to time stamp all files as they are created or copied by AmigaDOS. A file's temporal statistics may be displayed by the AmigaDOS LIST command. If for some reason a file's date or time is later than what the Amiga considers to be the present, then the LIST command simply displays Future for that file. Having a disk full of Future files tended to seriously hamper AmigaDOS operations under version 1.1 of the operating system. This problem has been corrected in version 1.2.

In view of the emphasis placed by AmigaDOS on the correct chronological status of its filing system, we were puzzled by the omission of a battery-packed clock on the Amiga 1000. In fact Commodore does provide a built-in timepiece with the Amiga 2000 and the Amiga 500 when the half megabyte expansion module is installed.

C Ltd, with their TimeSaver accessory for the Amiga 1000, is seeking to rectify Commodore's original omission. TimeSaver, which contains a battery-backed clock/calendar among other things, is installed in line with the Amiga 1000's keyboard cable. Simply remove the keyboard connector from the back of the Amiga and insert it into the TimeSaver. The short length of telephone handset cable which accompanies TimeSaver completes the hookup to the Amiga. Our sample of TimeSaver was devoid of any external markings with regard to the destination for its connectors. When we popped the cover off we discovered that the connectors were labeled on the printed circuit board.

C Ltd recommends that TimeSaver be tucked into a small nook under the keyboard. Doing so will keep TimeSaver out of the way, but it will also make access difficult when it comes time to change the battery.

Once it is installed, TimeSaver is in the position to intercept all data from the keyboard before it can get to the Amiga. Whenever the Amiga is powered up, or after a warm reboot, TimeSaver issues a break CLI command in the form of a CTRL-D data byte. This interrupts the commands in the Startup-Sequence allowing TimeSaver to interject a DATE command with the current temporal data. At this point TimeSaver normally issues a command to execute the Startup-Sequence so the Amiga can finish booting in the prescribed fashion.

The result of this series of events is

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The Amiga Event!

that the Amiga will have the current time and date when the bootup sequence is complete. There are some definite circumstances which may prevent the successful completion of the aforementioned sequence of events. To start with, the Workbench disk used for the bootup must have the DATE command in its c directory. If the boot disk does not open a CLI, the DATE command will not be implemented. The timing of these events is also somewhat critical. If the CTRL-D is issued too early or too late it may be ignored or the DATE command may not execute properly. In general the lack of a CLI or a TimeSaver timeout does not affect the operation of the Amiga.

The timing of TimeSaver's bootup sequence may be adjusted to suit the user. The most significant variable is how long it takes the user to insert the Workbench disk once the Amiga is finished with Kickstart. Too long a delay at this stage and TimeSaver will miss its chance. The default time delay of 11 seconds may be shortened or lengthened by the user. We found that the 11 second default value worked well with our bootup practices.

What's in a TimeSaver

TimeSaver has a lot more going for it than just a battery backed clock/calendar. Inside its 5x2x1½" package is an 8 bit microprocessor, 8 kilobytes of ROM, 8 kilobytes of static RAM, and a power supply arbitration chip in addition to the aforementioned clock/calendar. When the Amiga is turned off the contents of the static RAM and the operation of the clock/calendar is maintained by a built-in 3 volt lithium battery. This battery has a life of about one year in the TimeSaver. When the Amiga is turned on TimeSaver draw its power from the computer.

The eight kilobytes of RAM has two functions. One kilobyte is used as a keystroke buffer which stores the most recent thousand keystrokes. This data forms the basis of TimeSaver's Command Line History and Editing functions. The remaining seven kilobytes is used to store user-defined macros.

Anyone who has used the Amiga's Command Line Interface (CLI) will be well aware of its limited editing capabilities. An error anywhere in a command line forces the deletion and retyping of all the data following the error. Those of us who have graduated from the C-64 or VIC 20 or any of the PET computers which all come equipped with that absolutely wonderful full screen editor will also have some very strong opinions about the editing capabilities of the !#%%&*'!! AmigaDOS CLI.

TimeSaver's built-in Command Line Editor goes a long way towards making life liveable with CLI. It works like this. As you enter data at the Amiga's keyboard, all keystrokes are stored in TimeSaver's 1K RAM buffer. To edit an entry simply press the HELP and Up Arrow keys, which prompts TimeSaver to start a new line with a semicolon and reprint all keystrokes back to the last RETURN. The line may now be edited by positioning the cursor and inserting or deleting characters at will. The Command Line History function lets you scroll through the 1K buffer and edit any line which is still in it. When you are done simply hit RETURN and TimeSaver reprints the edited line as if it were being typed from the keyboard for interpretation by the CLI.

TimeSaver implements left cursor movement by issuing a keystroke sequence consisting of ESC, [, SHIFT D. If you wish you may try this on the Amiga and watch the cursor backspace over a character without erasing it. This still does not permit line editing, as CLI treats the above character sequence as part of the command line which is being entered—hence the need to reprint the entire line consisting only of the desired text. The presence of a semicolon at the start of a command line causes the line to be treated as a comment by the CLI.

Macros Large and Small

Above and beyond the aforementioned clock/calendar and Command Line Editing functions, TimeSaver provides extensive macro facilities. For those unfamiliar with the term, a macro is simply a brief command or keystroke sequence which replaces a much longer command string. All of TimeSaver's macros are initiated by an "action key" in conjunction with one or two other keys. There are six TimeSaver "action keys" for user-defined macros consisting of the CTRL, LEFT-ALT, RIGHT-ALT, LEFT-AMIGA, RIGHT-AMIGA, and RIGHT-SHIFT keys. In addition, TimeSaver has a number of built-in functions which are

all initiated by the HELP key.

Most of the built-in functions deal with various TimeSaver functions such as defining new macros, deleting old macros, reporting on available memory, setting the clock, and setting the TimeSaver function flags. The rest of the built-in macros consist of the most often used AmigaDOS commands. The function flags establish which TimeSaver functions will be active at any time. This lets you configure TimeSaver to avoid conflicts with your application software.

Based on the number of "action keys" and their possible keyboard combinations it is possible to define over 500 user macros. Over 7000 bytes is available inside TimeSaver for the storage of this data. It takes very little imagination to realize that conflicts with application software keystroke sequences are inevitable. The TimeSaver manual provides several ways to get around these keyboard conflicts. If you wish, all of TimeSaver's functions may be turned off with the HELP, RIGHT-SHIFT, 0 key combination. This will leave active only the HELP, 0 key combination, which turns TimeSaver back on. We found very little that would not work with TimeSaver. In fact the only program that we could not get to work as of this writing was the Mirror copy utility.

TimeSaver has optional built-in password security, which may be a bane or a boon depending on your point of view. TimeSaver has several ways to frustrate would-be tamperers. At its most fundamental level it just sits there and displays the ";enter code" prompt every four keystrokes. The TimeSaver manual seems to feel that the password prompt consists of ";enter password" which did not agree with what we saw. If you should forget your password you will have to remove the TimeSaver battery to restore the default password, which just happens to be "cltd".

For a really frustrating experience, just turn off the screen echo function. At this point the password prompt will not appear. You will also experience difficulty getting the password right if you lose count of your keystrokes. The password function may be activated at any time with the HELP, F8 keystroke combination. This is supposed to prevent an unauthorized reset of the Amiga by a frustrated tamperer. We found that it did not seem to help. Our Amiga would reset anyway. All in all we are not terribly enthused with passwords for our own use, but if you want it TimeSaver will let you have it.

Caution

A year is a reasonably long time in the life of a computer, but it is not forever. The time to change the TimeSaver battery may come sooner than you expect. This could be a traumatic experience for the uninformed. When it happens the Amiga's keyboard will seem to lock up, which could initiate a repair call by an uninformed user. At the very least up to 7000 bytes of stored macro data will be lost if you use that feature extensively.

It is possible to change the TimeSaver battery without any loss of data if the battery's demise is anticipated. Simply remove the old battery and put in a new one while the Amiga is turned up. It would have been nice if TimeSaver warned the user via an onscreen prompt if it detected imminent battery failure.

We did express our concern about these matters to C Ltd, and they agreed that something would be done. In fact they indicated that by late summer they will supply a TimeSaver utility which will allow the user to upload or download the entire contents of the 7K RAM macro buffer to and from disk. This will be installed in the TimeSaver ROM and upgrades will be made available to existing users for a reasonable cost. They even went so far as to confirm their intentions in writing.

Conclusions

Overall we were quite pleased with TimeSaver. The clock/calendar function is most welcome, and the Command Line Editing function is a pleasure compared to what we had before. Our store of macros grows continuously while we patiently await the arrival of the upgrade ROM. Best of all we

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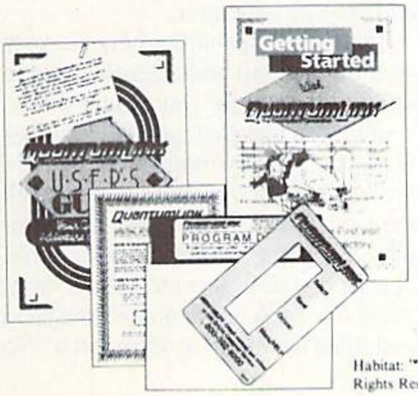
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were able to add all of these features without opening the Amiga and with a minimum impact on the execution of existing software.

C Ltd, 723 East Skinner, Wichita, KS 67211 (phone: 316-267-3807).

—Morton Kevelson

DIGA!
Aegis Development
Disk; $79.00

It's 3 a.m. in the high stakes poker game of commercial telecommunications programs, and Aegis Development has upped the ante with *Diga! Diga!* sets a new standard in flexibility and ease of use in the increasingly complex world of telecommunications. In fact many of my (fairly minor) complaints about this program stem from my applying *Diga!'s* own standards to itself.

Diga! handles the basics with grace and style; even the color-cycling bootup title screen from the studios of Sachs Enterprises reflects this. *Diga!* is organized around the central metaphor of a phone book. Your phone book (and you can have more than one) contains the usual name and phone number categories as well as the more unusual general information fields and selectable baud rate. More important, here is where you access the twin keys to unlocking *Diga!'s* power: configuration and script files.

The configuration files hold a very flexible set of parameters affecting everything from color and resolution of screen to the terminal emulation and macro keys. The screen resolution, aside from the normal Amiga modes, can also be driven in "overscan" allowing you to have 24 lines (49 in interface) and still maintain a visible menu bar. *Diga!* automatically defaults to a more compact font when you select the higher resolutions. The screen has its own menu screen listing the various column and row options—if you choose a non-standard variation, 14 lines of text with 80 columns for example, you can give it a particular name like "SpacedOut" and that name will then appear in the pull-down menu under "Lines."

The quickest way to access the range of settings that most commonly need adjusting is with *Diga!'s* Fast Menu, an Aegis trademark. Unlike Animator with its often cryptic icons, *Diga!'s* Fast Menu gives you a very clearly laid out screen detailing baud rate, protocol and transfer options, number of columns and lines, and 15 different varieties of "parity"—actually the word length, parity, and stop bit combination (e.g. 8N1). This menu in giant screen gadget form is available via the Help key; Aegis did a very nice job of finding keyboard equivalents for most commands.

One of the more powerful features of *Diga!* comes from its ability to load different terminal emulations. Included on disk are emulations for TTY, ANSI, Tektronix 4010/14, Dec VT100, and VT52. The Tektronix emulations allow you to send and receive graphic files from a mainframe or mini. As many of us do not presently have this opportunity, Aegis included a set of graphic files that can be viewed using this emulation. These files are vector based, using points and plotted lines, instead of bit mapped, allowing you to magnify parts of the picture without loss of resolution. Aegis has also included a program, TektoDraw, that converts downloaded Tektronix files to the Aegis Draw format. The inclusion of this feature, and the entire Tektornix emulation capability, speaks to the inherent power of *Diga!* and the Amiga.

Diga!'s other major prowess lies in its script capabilities. Script files, written with your favorite ASCII word processor, allow you to automate your telecommunicating actions from start ("Wait until 4:50 a.m. to call Payola BBS") to finish ("Download everything; log-off"). *Diga!* includes a complete script language consisting of 33 commands. Aside from telecommunication specifics such as "XMSend" (for XModem Send) and "BuffOn" (for turning on your capture buffer), the *Diga!* script language can also handle minor logic branching with its "If-Then-Else" and "Goto" structures.

The script capabilities here are very well thought out and extensive—there really is very little you cannot do via scripts. The included sample script files for logging onto CompuServe and Bix are very instructive. Let's step through the more complex Bix file for an example of scripting finesse. First the script checks to see if you are calling from the phone book and if not sets the baud and dials the number. If we get a "No

Carrier" from the modem we abort, but if not we sift through Tymnet's garbage characters and tell them our terminal type followed by the request for Bix, our name, and password. Once in, we turn on the buffer, giving it a specific file name. Next, time to check the mail, if any, so we tell Bix we can handle whatever they can throw at us page-size-wise, and then start a mail downloading loop. When we hit the "Nothing in In-Basket" prompt, we break out of the mail reading loop and go to the main reference reading mode sending the required words until we have captured all the current messages. There are two special conditional branches in this last routine which will send us to the appropriate subroutine when the correct signal is sent from Bix. And with a "DoAt 3:45" command, it can all happen while you snooze.

So far, *Diga!* has performed all the normal telecommunication functions—but as many people said when they heard Aegis had *Diga!* in the works, "Who needs another telecommunication program?" In other words, what makes *Diga!* truly special? How about a protocol that allows two *Diga!* users to send and receive messages and files simultaneously—I'm talking both doing both at the same time! That's Doubletalk, the new protocol that makes telecommunicating a real joy. It is quite a hoot to be chatting in the separate Doubletalk windows (no more having the line you're furiously typing overwritten by the incoming words) and to watch the File transfer tic off the percentages sent and received. Doubletalk works by "carving up" the modem bandwidth—so that while your file transfer may take up 900 of your 1200 baud, your message is going across at the remaining 300. What saves the transfers from being seemingly longer is a more advanced error checking algorithm. The chat mode definitely seems slowed down, however, even when not in the midst of a file transfer; it would be better if *Diga!* were smarter and could allocate the bandwidth on the fly according to the need or user option. Still it is pretty exciting to be involved in a Doubletalk transaction—sort of puts the fun back in those long file transfers.

The other groundbreaking area included in *Diga!* is the remote access capability. *Diga!* actually allows you to turn your computer into a mini-BBS without having to dedicate your machine—or your life—to the process. Once *Diga!* is in "Remote" it waits for incoming calls and greets the callers with a "Welcome" file. If they know the proper password (of which there are two levels: one for general entry and one for performing SYSOP-like maintenance) your caller can perform a wide variety of functions: getting a list of options, pulling a directory, listing available volumes, changing directories, reading a file online, changing the host's file transfer protocol, and downloading and uploading files. With SYSOP status you can also copy files from one volume to another or delete files, remotely. The Remote feature additionally records the date and time a caller logs on and notes any unusual occurrences such as an incorrect password.

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BASIC 8.0
Patech Software/Computer Mart
Commodore 128
Disk; $39.95

It has been observed by many that nothing is as constant as change. This is certainly true with regard to personal computers and the programs which let us use them. In particular the BASIC language packaged with every Commodore computer has shown significant advances that parallel the introduction of the new machines.

Barely two years have gone by since we first saw the C-128. At its introduction the C-128 offered more power per buck than any other 8 bit computer. Its hardware includes the revered VIC-II and SID chips which have brought fame, fortune, and fantastic software to the C-64. For programmers there is 128K of RAM to play with, a second microprocessor for use with the CP/M operating system, and a wonderfully enhanced BASIC which lets us program graphics and sound without the need for the endless PEEKs and POKEs associated with the C-64. There is even an 80 column, 16 color display with 640 by 200 pixel resolution...*and we were told that we couldn't do graphics on it!*

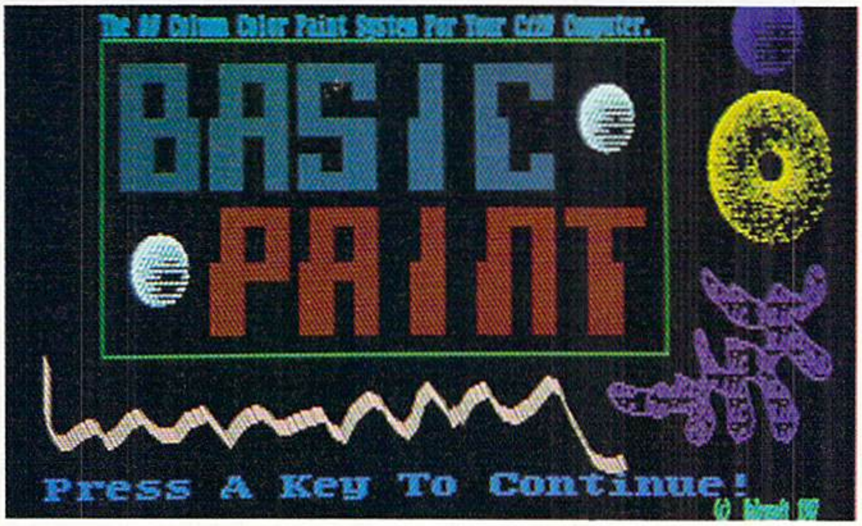
Needless to say we were nonplussed. There we were, sitting in front of a Commodore computer with more features and a better BASIC than ever before, and it restricted us to text on the 80 column screen. Subsequent investigations indicated that the situation was not all that bleak. In fact the 8563, the 80 column video display chip, does support bit mapped graphics. Furthermore, although the 8563 lacks the hardware sprites of the VIC-II chip, it does include several bit mapped color modes along with hardware block transfers of bit map data. On top of it all the 8563 has its own 16 kilobytes of video RAM which is in addition to and completely independent from the 128 kilobytes available to the rest of the system.

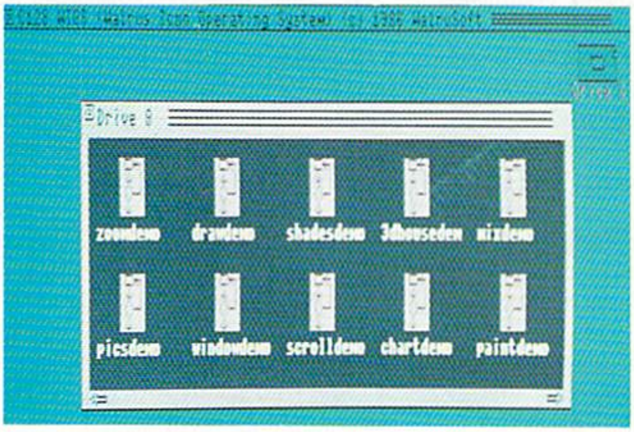
The problem is that getting at the 8563's high resolution resources is not easy. The entire 8563 chip and its dedicated RAM shows up at only two spots in the C-128's memory map ($D600 and $D601). These two addresses act as a window into the world of the 8563 through which all instructions and data must pass. BASIC 7.0, that wonderfully expanded version of PET BASIC, in no way acknowledges the existence of the 8563's resources beyond the display of text. The traditional methods of PEEKing and POKEing the graphics screen do not work in this case. If you want to do 80 column graphics you have to resort to machine language.

This is where BASIC 8.0 comes into the picture. BASIC 8.0 adds extensive 80 column graphics capabilities to the C-128 for BASIC programmers. It is a disk-based system, which means that the BASIC 8.0 programming code has to be loaded from disk each time the C-128 is turned on. You do have the option of buying a ROM chip ($19.95) which contains the BASIC 8.0 algorithms. This chip is installed in the empty ROM socket found inside every C-128. Once installed, simply holding down the CONTROL key on power up or during a reset will automatically download the BASIC 8.0 system into working RAM. Note that the BASIC 8.0 ROM version is identical to the disk version, as it does not run directly from the optional ROM.

The BASIC 8.0 package contains a 190 page manual, a non-copy protected system disk, and a demonstration disk. The system disk is used to create a BASIC 8.0 editor disk, a BASIC Paint disk, and a BASIC 8.0 Run Time disk. Once these three disks have been created the original distribution disk becomes superfluous, as none of the working disks are copy protected.

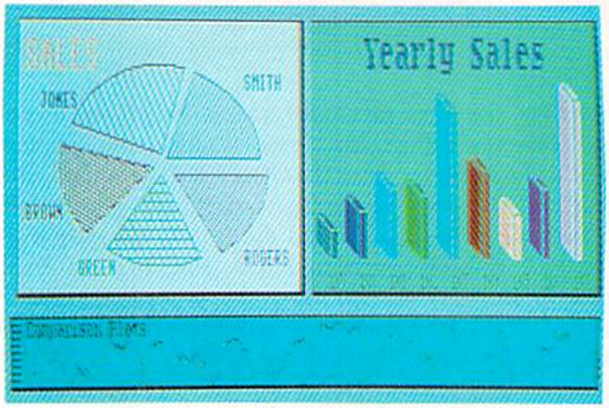
The editor disk is what you boot from when programming in BASIC 8.0. This loads the BASIC 8.0 interpreter routines into RAM. Subsequent use of the disk drive is for the loading and



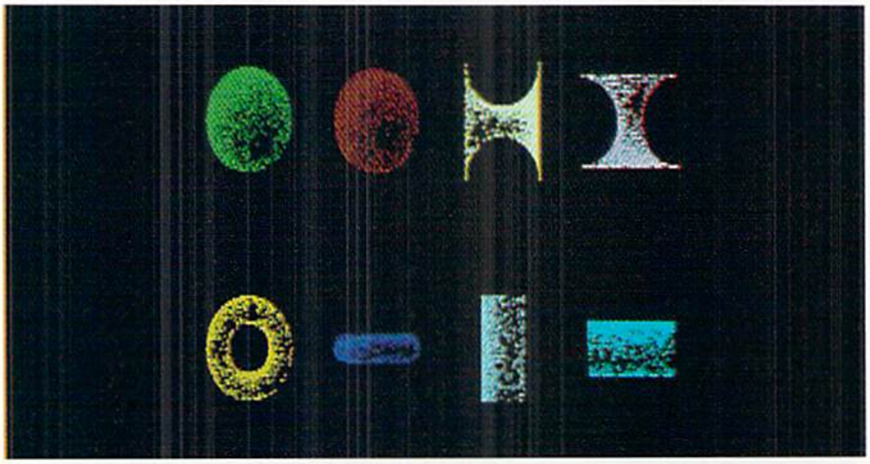


Top: a sample 640 x 200 pixel graphics screen. Bottom: the WIOS Workbench has the look and feel of a real desktop metaphor, but only loads and runs programs.
READER SERVICE NO. 226

PHOTOS BY MORTON KEVELSON



Top: sample 640 x 200 pixel graphics screen. Bottom: some of BASIC 8.0's Rylander solids. Clockwise from top left: sphere, spool, toroid (from top & side) and cylinder.



saving of program and data files as usual. Under the BASIC 8.0 system the C-128 boots with 100,861 bytes free, of which 36,605 bytes are available for program storage.

All of BASIC 8.0's commands start with the commercial at (@) symbol. The BASIC 8.0 interpreter is wedged into BASIC 7.0's syntax error routine where the @ is intercepted and the command is processed. If the @ is not present, the command is processed in the usual fashion. All of BASIC 7.0's commands are still available with the exception of the graphics commands. The 40 column graphics commands utilize memory which has been taken over by BASIC 8.0. Using the 40 column graphics commands in conjunction with BASIC 8.0 will crash the machine.

The 40 column screen may still be used for text output. In fact it is a good idea to use the 40 column display as the default text output device, as BASIC 8.0 ties up the 80 column display when it is doing graphics. This brings us to one of BASIC 8.0's more annoying quirks. The designers made the assumption that a BASIC 8.0 syntax error would most likely occur during the display of high resolution graphics. To aid in debugging BASIC 8.0 programs, the screen is automatically cleared when a syntax error occurs, even if the program is in text mode. This holds true for the 40 column display which cannot even display bit map graphics while BASIC 8.0 is running. The result is that all screen data is lost after a syntax error while experimenting in immediate mode. This negates much of the advantage of BASIC and the Commodore screen editor as a learning tool for BASIC programmers.

The editor disk also contains a selection of 11 screen fonts, seven printer drivers including a color driver for the Canon PJ1080A, several utility programs, and the WIOS (Walrus Icon Operating System) Workbench program. WIOS provides a graphics user interface as a desktop metaphor for easily loading and running BASIC 8.0 programs. WIOS, which is written in BASIC 8.0, is not meant to serve as a full-featured user interface. It was included as a demonstration of what can be done with BASIC 8.0 and to serve as a sample program for the edification of the user.

The Run Time disk provides the means for distributing programs written in BASIC 8.0. It is an autobooting disk which includes the BASIC 8.0 run time code, BASIC 8.0's printer drivers, the WIOS Workbench, and your own programs written in BASIC 8.0. The default setup automatically runs WIOS which displays all of the programs whose file names start with B8. The setup may be easily modified to autoboot any BASIC 8.0 program. The run time module does not provide for the listing or editing of 8.0 programs.

BASIC Paint is a full-featured bit map drawing program for the C-128's 80 column graphic screen. In addition to the mandatory freehand drawing mode, BASIC Paint provides for lines, boxes, circles, polygons, and solid and pattern fills. BASIC Paint will automatically draw three-dimensional solid shapes such as spheres, cylinders, and toroids. There is a cut and paste function and a zoom mode for precise editing. Input to BASIC Paint is via the Joystick or the 1351 mouse.

The most fascinating part of BASIC Paint is that it is also written in BASIC 8.0. BASIC Paint may be listed and modified just like any other BASIC 8.0 program. In effect BASIC Paint is a tour de force of BASIC 8.0 itself. Lack of space prevents us from providing full details on BASIC Paint. However, we will note that BASIC Paint is comparable to stand alone drawing programs which sell for the price of the entire BASIC 8.0 package.

The BASIC 8.0 Demo disk must be considered an integral part of the BASIC 8.0 package. The BASIC 8.0 programs which make up this disk and which demonstrate the speed and power of its graphics also serve to illustrate how the BASIC 8.0 commands are applied. Prospective programmers should not neglect this source of information when learning BASIC 8.0.

The BASIC 8.0 manual is a wealth of information, as it very well should be. Each of the major BASIC 8.0 topics has a dedicated chapter. In addition, there is an alphabetized guide to all the BASIC 8.0 keywords. While the overall organization of the manual was good, the authors did occasionally change thoughts in midstream. This re-

PHOTOS: MORTON KEVELSON

sulted in some important items being unexpectedly presented in the midst of a related subject. As a result the lack of an index became all too apparent. We found that the information we were looking for was generally available; we just had to hunt a bit to find it. The publisher has indicated that a new and presumably improved manual is already in the works.

A Summary of BASIC 8.0 Commands

Here is a brief overview of the BASIC 8.0 commands. As we mentioned above, all of BASIC 8.0's commands start with the @ symbol. Most of BASIC 8.0's commands accept one or more parameters. Unlike other Commodore BASICs, parameters are separated from their associated keyword by a mandatory comma.

SETUP

@WALRUS–BASIC 8.0 was created by David P. DaRUS and Louis R. WALlace. This command sets up the 16K or 64K video RAM systems and must be the first command of any BASIC 8.0 program.

@CLEAR–Clears the screen and sets the bit map colors.

@COLOR–Sets the bit map colors.

80 Column Graphics Memory

The C-128 is equipped with an 8563 video display chip. In bit map mode this chip can generate a display which is 640 pixels wide by 200 pixels high with 16 colors (8 colors in 2 brightness levels). The chip can operate in both interlaced and non-interlaced modes, although this does not increase the vertical resolution. In the original C-128 the 8563 has access to a 16 kilobyte block of dedicated RAM. The latest versions of the C-128 as well as the C-128D may be equipped with 64 kilobytes of RAM which is dedicated to the 8563. This memory is normally used to store the data for both Commodore character sets which are used by the 80 column display. The text screen and its associated color and attribute data are also stored in this memory.

The 8563's video RAM can only be accessed by the video display chip. It cannot be directly accessed by the microprocessor. The video RAM is completely independent from the 128K used by the C-128. As a result none of the 80 column display operations utilize any of the system's RAM.

The 640 by 200 pixel bit map consists of 128,000 pixels. The 16K of video RAM contains 131,072 bits. This does not leave enough room for a full bit map display with color. The 640 by 200 pixel bit map with 16K RAM must be in monochrome.

The 8563 supports variable sized bit maps. This permits a tradeoff between the number of pixels displayed and the use of color. The 8563 also has an adjustable color cell whose width is always 8 pixels but whose height may be varied from 2 to 16 pixels. This permits some additional tradeoffs with regard to bit map size versus color flexibility. Note that the 8563's bit map display is similar to the VIC-II's high resolution display in that only two colors are allowed in a color cell, but the colors of all cells may be independently specified.

The 8563 is capable of addressing up to 64 kilobytes of dedicated video RAM. The video RAM chips supplied with the original C-128s consisted of two 4416s. A 4416 is a 64 kilobit chip (that is 65,536 bits, not bytes) organized as an array which is 4 bits wide and 16,384 addresses long. These chips may be replaced by a pair of 4464s. A 4464 is a quarter megabit chip (262,144 bits, not bytes) organized as an array which is 4 bits wide and 65,536 addresses long. A pair of these chips will upgrade the video RAM to 64 kilobytes, which is enough to store eight full bit maps with varying amounts of color data. As with the original video RAM this memory is in addition to and independent from the C-128's 128K of program RAM. BASIC 8.0 supports both the 16K and 64K RAM configurations. The C-128 operating system will only recognize 16K of video RAM, but it will work just fine with the 4464 chips. The extra RAM beyond the initial 16K will be ignored.

BASIC 8.0 supports eight screen formats on C-128s equipped with 16K of video RAM. These range from a 640 by 200 pixel monochrome screen to a 640 by 104 pixel screen in 16 colors with an 8 by 2 pixel color cell. Intermediate bit map sizes are obtained with 8 by 16, 8 by 8, and 8 by 4 pixel color cells. Some screens may be displayed in interlaced mode.

On a C-128 which is equipped with 64K of video RAM, BASIC 8.0 supports a full 640 by 200 pixel bit map in 16 colors with any size color cell. Multiple screens may be stored in 64K video RAM. Screens in video RAM may be rapidly swapped using the 8563's hardware block move capabilities. Thus 64K of video RAM will greatly expand the capabilities of BASIC 8.0.

Although only two chips need to be replaced to upgrade the C-128 to 64K of video RAM, it is not a simple job. The existing chips are soldered into place in a crowded portion of the C-128's printed circuit board. We recommend this task only to experienced users with the appropriate skills.

Readers of the *Commodore 128 Programmer's Reference Guide* may have noticed that the 8563 supports 64K of video RAM using 4164 chips. The 4164 is a 16 kilobit chip organized as an array which is one bit wide by 65,536 addresses long. Although this chip is mentioned in an official Commodore publication, it should not be used for two reasons. First, the C-128's operating system will not recognize the 1 bit by 64K organization of the 4164. Second, a total of eight of these chips is required to make 64K of RAM. There is only space for two chips on the C-128's circuit board. Installing eight 4164's would require extensive modification to the board. The reason for the inclusion of the 4164 in the official Commodore documentation is that the quarter megabit 4464 was not yet available at the time the 8563 was developed. The 8563 data in the *Commodore 128 Programmer's Reference Guide* is simply copied from MOS Technology's data sheet for the 8563.

@DRWMODA, @DRWMODB–Defines global drawing modes for graphic commands; sets 3-D viewing mode as parallel or perspective.

@MODE–Selects the combination of screen types which can be used.

@SCRDEF–Defines a custom screen format or type.

@SCREEN–Selects the screen to be used for drawing or viewing. A 16K video RAM system can only have a single screen. A 64K video RAM system may have eight screens.

@TEXT–Sets up the standard text screen.

DRAWING COMMANDS

@ANGLE–Rotates the view angle about all three axes. All six possible rotational sequences are available. BASIC 8.0 has built-in 3-D capabilities.

@ARC, @BOX, @DOT, @LINE, @CIRCLE–These are the standard drawing commands. All of them accept parameters which place them in a three-dimensional space. Rotation, scaling, and clipping are also supported as required.

@BRUSHPATRN–Converts a brush to a pattern.

@SPHERE, @SPOOL, @TOROID, @CYLNDR–A subset of BASIC 8.0 for drawing Rylander solids. Richard Rylander published some algorithms for drawing geometric solids using shaded fills in *Micro* Magazine. These routines have been incorporated in BASIC 8.0.

@CHAR–Places text data on the bit map.

@COPY–Moves a rectangular area of the screen using the 8563's hardware block transfer.

@FLASH–Flashes a rectangular area of the screen.

@GROW–Controls the direction of growth for the thickness parameter of the drawing commands.

@ORIGIN–Sets the coordinates for the center of rotation and the perspective vanishing point.

@PAINT–Fills an area with a pattern or a solid.

@PIXEL–Interrogates the status of a pixel.

@PTR–Plots a spritelike pointer on the screen.

@SCALE–Changes proportions of the plotting units.

@SCLIP–Sets the clipping boundaries for the Rylander solids.

@SCROLL–Scrolls the bit map area.

@STYLE–Sets the plotting pattern for the Rylander solids.

@VIEW–Sets the viewing angle for parallel draw mode.

@WINDOWOPEN, @WINDOWCLOSE–Defines a subscreen on the main screen.

MEMORY MANAGEMENT

@BUFFER–BASIC 8.0 supports the C-128 RAM expansion module. A maximum of 10 banks of up to 64K each may be defined as buffers for storage of graphic data.

@STRUCT, @SDAT, @SEND–BASIC 8.0 provides four data structures: pattern, logo, font, and brush. These three keywords define the data structure.

@CBRUSH–Change a stored brush by reversing, reflecting, or flipping it.

@DISPLAY–Recalls a stored screen or brush to the display.

@FETCH–Recalls an @STASHed area to the display screen.

@FONT–Loads a custom font for the text screen.

@LOGO–Sets structure for logo data.

@LSTRUCT–Loads a structure into memory.

@PATTERN–Sets pattern structure number.

@STASH–Places a rectangular screen area into a brush structure.

@STORE–Saves an entire screen to disk as a brush structure.

@ZOOM–Enlarges an @STASHed structure to the screen.

MISCELLANEOUS

@HCOPY–Prints the current screen on a dot matrix printer. BASIC 8.0 reserves a section of memory for custom printer drivers, of which several are supplied on disk. The manual includes the source code of the drivers to permit machine language programmers to write their own.

@MOUSE–Both the 1351 proportional mouse and the joystick are supported as input devices for BASIC 8.0.

Conclusion

BASIC 8.0 is both a boon and a bargain for C-128 programmers. There is little more to say.

Patech Software, Inc., P.O. Box 5208, Somerset, NJ 08873 (phone: 201-545-1571). Marketed by Computer Mart, Dept. S, 2700 NE Andresen Road, Vancouver, WA 98661 (phone: 206-695-1393). *—Morton Kevelson*

LABEL MAKER
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Label Maker is Cheatsheet Products' entry in the label printing program market, currently crowded with dozens of commercial and public domain programs that perform similar if not identical functions. Here at *Ahoy!*, we can expect to receive at least one label-printing program per week.

In the interest of our novice readers, I'd like to point out the fact that label printing programs are quite simple to write, and are usually among the first things attempted by BASIC neophytes, especially those who have just purchased a printer.

Usually, the need for a label can be satisfied by an OPEN statement followed by a few PRINT# commands and a CLOSE at the end. Of course, this is too much to expect of a beginner, as it assumes a familiarity with BASIC and device handling. This will also not suffice if more than a couple of labels are needed.

In such a situation you have two options: Write a program to print the labels for you, or buy a program such as *Label Maker.* If you already have the names and addresses or other data stored on a disk as by a database program, it would be much more difficult to write the program, because you would also have to learn how to interpret the database files. We have printed articles on how to write label-printing programs, so we'll now turn our attention to *Label Maker.*

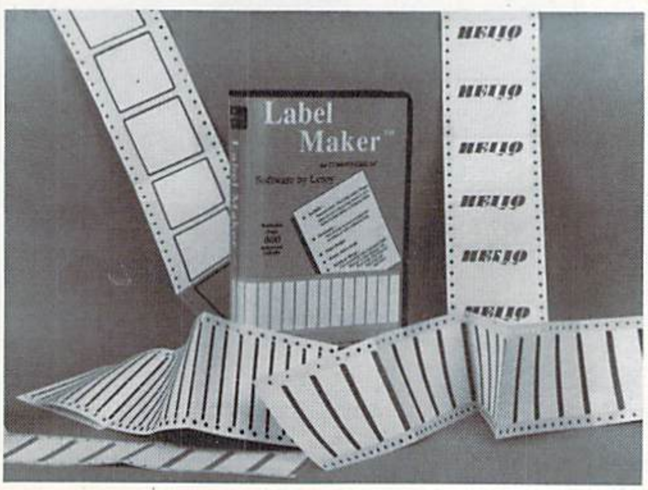
Though *Label Maker* is by no means user-unfriendly, it lacks the professional feel and look. It reacts like a very good quality public domain software.

Label Maker does offer a large variety of features not implemented in other programs of this type. It also includes some blank labels of various sizes and types for practice purposes.

The documentation is not necessary, as the program prompts you for all the required information. In case you do encounter any problems, you will find a well-written, though a bit simplistic, manual of some 23 pages (professionally typeset, unlike the documentation we have come to expect from other software companies).

When using the program, you are first prompted for the type of label you wish to print. All the choices are presented on a menu, which highlights each choice and displays a small rendition of the item to be printed out. The miniature renditions are complete with computer printer sprocket holes, and are drawn with their respective dimensions printed beneath. As you move the highlighting choice bar down, the rendition is updated to display the current label type. Label types supported are standard, file folder, hand fed envelopes (both large and small), continuous feed envelopes, name badges, disk labels (3½ and 5¼"), rotary file cards, audio cassette tapes, and shipping and order labels.

Each screen is drawn using Commo-



Label Maker *offers a large variety of features, along with over 500 blank labels in assorted shapes and sizes (see samples on page following). READER SERVICE NO. 274*

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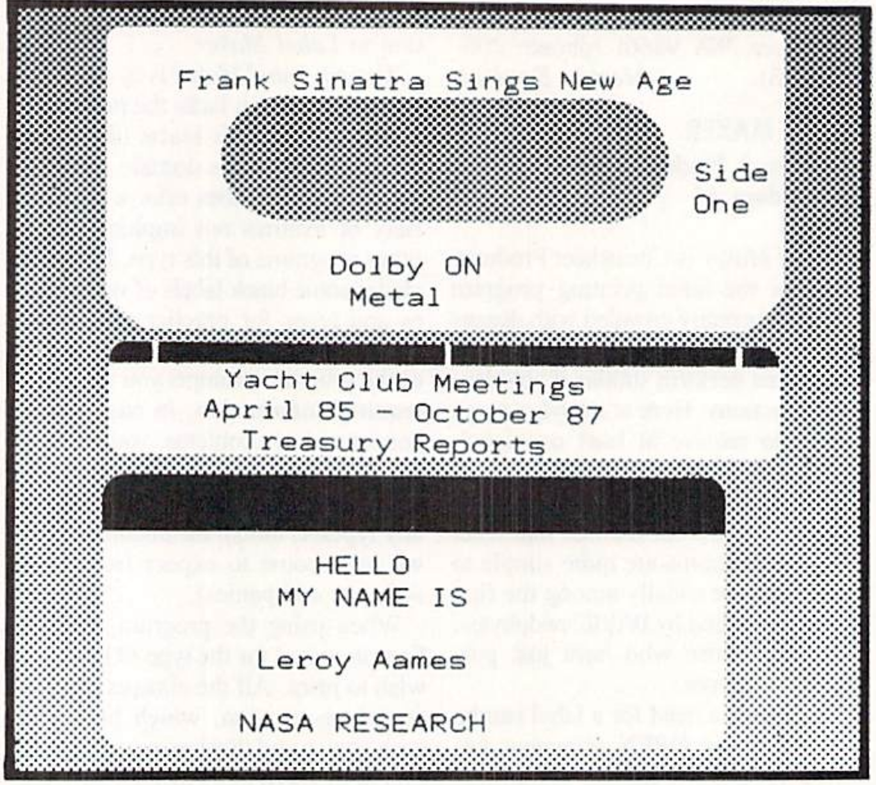
The publisher cannot assume responsibility for errors in the above listing.

dore graphic text characters, which is rather obvious as you watch the screen drawings and the makeshift windows taking shape. It is also rather obvious that the routine that accepts the messages to be printed on the labels was written in BASIC and compiled, as it intermittently leaves the cursor on the previous line of input. This is no real problem when it comes to printing out the labels, as the program totally ignores the phantom cursors.

As I previously mentioned, the program allows you to use data stored from other databases or word processors for the text on the labels. The book explains the required formats which must be followed should you want to incorporate your previously entered data into the *Label Maker* program.

Even though this program does not sport all the pretty graphic screens, pop-up windows, and other unnecessary bells and whistles of its competition, it does offer real features in their place. This program functions like most public domain software in that it may not be pretty, but it does get the job done, and it is not a burden to learn to use.

Cheatsheet Products, Inc., P.O. Box 111368, Pittsburgh, PA 15238 (phone: 412-781-1551). *—Tim Little*



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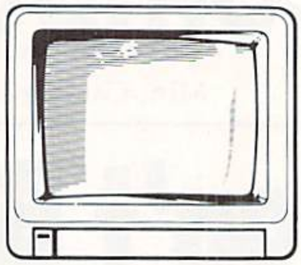
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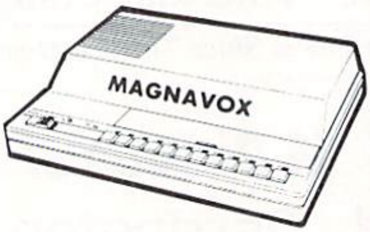
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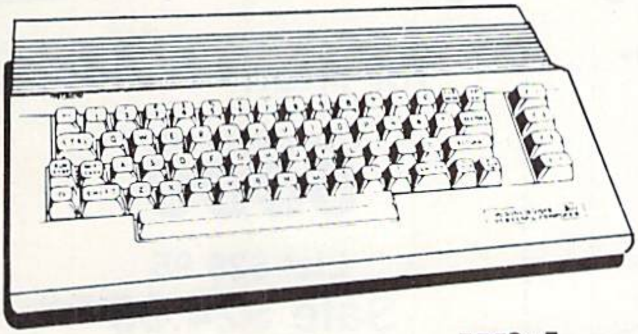
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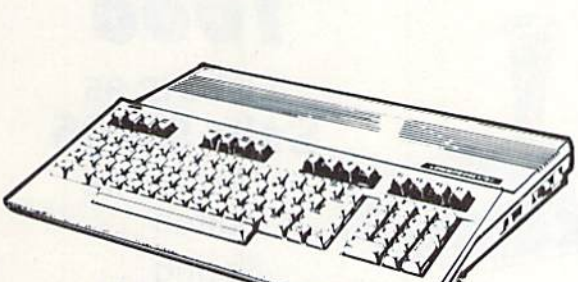
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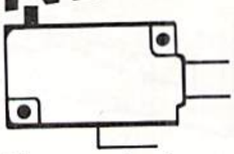
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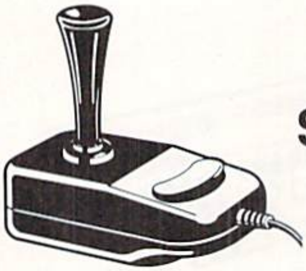
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For your Commodore 64 **For your Commodore 64**

300/1200 Baud • Auto Dial • Auto Answer • Upload & Download

The Complete Telecommunications Package offers you all this plus...

- AutoCom C-64 & C-128 Software
- Tone & Pulse Dialing
- Dialing from Keyboard
- On-line Clock
- Capture and Display High Resolution Characters
- Download Text, Program or Data Files
- File & Program Transfer
- Monitor Speaker
- Stores on Disk Downloaded Files
- Reads Files from Disk and Uploads Text or Program Files
- Select Any Protocol (access almost any computer or modem)
- Plus Much, Much More

Complete Auto Dial Telecommunications Package

"The only telecommunications package you will ever need."

Sale



1200 BAUD MODEM

Sale $74.95

List $199

(Add $3.00 shipping.*)

5 YEAR Limited Warranty

S & S Telecommunication Games

Two disks included so you can give one to a friend and compete over a modem!

S & S

No. 1 - The Classics — Included are ***Telechess:*** A chess modem program which features hi-res graphics, a printer option, automatic pawn converison and on-screen display of pieces taken. ***Telegammon:*** An excellent backgammon program in lively colors featuring all conventions of backgammon play. ***Telechecker:*** The checker version of Telechess.

No. 2 - Strategic Placement — Inlcudes ***Teledice:*** A 1 to 4 player version of the popular dice game YAHTZ (called Yahtzee). Fun to play on just one computer, you'll have a hard time losing dice. Also included is an on-disk tutorial. ***Telecon 4:*** A hi-res program based on the popular game Connect Four. Easy commands make it great for young and old.

No. 3 - Hunt And Find — Includes two games, ***Teleship:*** A one or two player game, excellent graphics make it outstanding. One player can play against the computer, which plays a formidable game. A choice of single shots or a salvo is supported. ***Telematch:*** A two player game that demands your total concentration. 30 cards. Fifteen pairs. Match shapes, colors, or sounds.

(Add $3.00 shipping.*)

List $19.95 each **On Sale For Only $9.95 each!**

BobsTerm Pro

A complete telecommunications program with all the features you will ever need. Completely menu driven and can upload and download data in practically all protocols available. You have full control of the 28K buffer and can view an on-screen buffer status display. Includes full sized manual; an informative and educational tool designed to introduce everything you need to know about telecommunications, full 80 column screen support, extended editing features and commands and much more.

List $49.95 **Sale $24.95** *Coupon $19.95*

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22292 N. Pepper Road, Barrington, IL. 60010
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SALE • *Famous National Brand* • SAVE

NLQ 180

Hi-Speed Printer Sale

•160 - 180 CPS • Near Letter Quality •
Lifetime Warranty*

Price Break Thru

Sale $179⁹⁵

(Add $10.00 shipping.*)

List $499.95

Below Wholesale Cost Prices!

NLQ-180

60% OFF LIST PRICE

Sale Expires 8-31-87



NLQ-180 Premium Quality Printer

Near Letter Quality Selectable From Front Panel Controls • High Speed Dot Matrix• Letter Quality Modes • 8K Buffer frees up computer 4-times faster • Pica, Elite, Italics, Condensed • Super Graphics • Business or Personal • Tractor/Friction • 15 Day Free Trial • Lifetime Warranty on Print Head* • 6 Month Immediate Replacement Policy •

Lifetime Warranty*

Fantastic Graphics

Fantastic Price

Sale

No One Sells This Printer For Less!

— APPLE — ATARI — EPSON — NLQ180 SPECIFICATIONS — IBM — COMMODORE — ETC. —

Print Buffer
8K bytes utility buffer

Printing Direction
Text Mode — Bi-directional
Graphic Mode — Uni-directional

Interface
Centronics Parallel Port

Paper
Plain paper, Roll paper, Single sheet
Fanfold, Multipart paper: max. 3 sheets (original plus 2 copies)

Character Fonts
Pica, Elite, Italics, Condensed

Printing Method
Impact dot matrix

Printing Speed
160-180 CPS at standard character printing

Printing Characters
Standard 9 x 9 dot matrix
NLQ 12 x 18 dot matrix (33cps)
Character size: 2.12 x 2.8 mm (standard)
Character sets: Full ASCII character set (96)
32 International characters

Ink Ribbon Cartridge
Ribbon Life: 3 million characters/cartridge

Physical Dimensions
Size: 15'' x 12'' x 5''
Weight: 12.7 lbs.

Maximum Number of Characters

Standard:	10 cpi	80 cpl
Standard enlarged:	5 cpi	40 cpl
Elite:	12 cpi	96 cpl
Elite enlarged:	6 cpi	48 cpl
Condensed:	17 cpi	132 cpl
Condensed enlarged:	8.5 cpi	66 cpl
Condensed elite:	20 cpi	160 cpl

— INTERFACES —

Atari $39.95 Apple II $44.95 Commodore $29.95 IBM $24.95 Laser 128 $19.95 Macintosh $49.95

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Now With Spell Checker !

90,000 Word Dictionary • LED Readout Flags Mistakes Before They Reach Print • 1 Line/240 Character Automatic Correction • Free 4K Memory Card • Edit 2 to 4 Pages From Typewriter Memory • Centronics Parallel Port • Daisy Wheel Printing • 15 Day Free Trial • 90 Day Immediate Replacement Policy •

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MISTAKE FREE

NEW

SUPER VALUE

Sale $249^{95}

(Add $12.00 shipping.)

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Extra Replacements:
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Daisy Wheels . . . $12.95
Extra 4K Cards . . $29.95

Get the edge over classmates, collegues, and competitors with this fantastic printer/typewriter with **"Spell Checker"**. With over 90,000 words in its dictionary and the capacity to add 510 more of your choice, you may never misspell again. No more re-typing, when an error is identified, three beeps sound. The LED readout has a one line buffer so mistakes are corrected before they reach print. This means you're virtually ensured of nothing less than perfectly typed letters and documents with no misspellings! Also, you receive a **free 4K memory card** with your purchase. This card equips the typewriter with 4,000 characters of storage which is equal to approximately 2 to 4 pages of typing. Edit right on your typewriter using your LED screen. A $45.00 list value for **FREE!** Fantastic! List $399.00 **Sale $249.95**

PRINTER:

Paper width	12 inches
Printing width	10 inches
Cassette ribbons	Correctable film, one-time film, and fabric
Correcting tapes	Lift-off and cover-up
Line space lever	0,1,1-½,and 2
Keyboard selector	I and II
Print pitch	10,12, and 15

KEYBOARD:

Keys/characters	44/96
Automatic carrier return	
Automatic correction	1 line/240 ch.
Automatic underline	
Relocate key	
Tabulation	
½ back space key	

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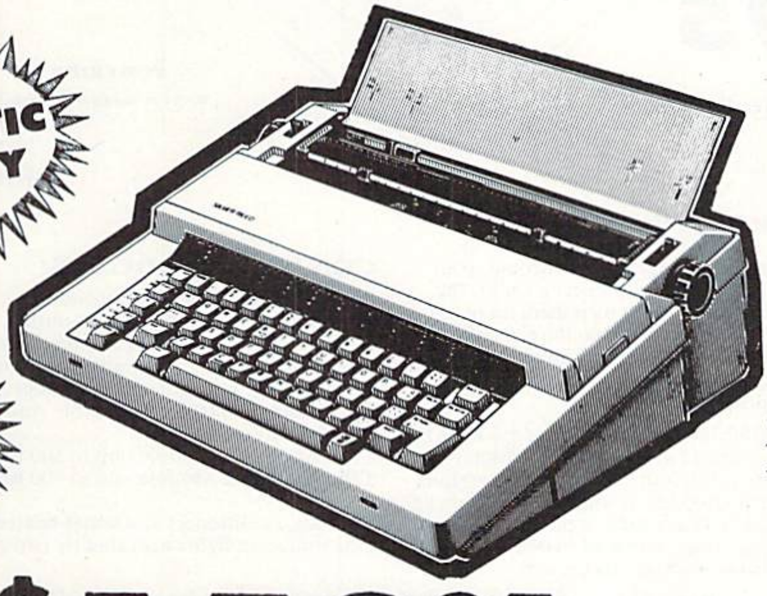
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Daisy Wheel
Printer/Typewriter

Superb Computer Business Printer Combined With Deluxe Electronic Typewriter • Two Machines In One • Superb Letter Quality Correspondence • Key In Buffer • 12" Extra Large Carriage • Drop In Cassette Ribbon • Precision Daisy Wheel Printing • Centronics Parallel Port • 15 Day Free Trial • 90 Day Immediate Replacement Policy

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Automatic Centering



Made by Silver Reed

SUPER LOW PRICE

Sale $ 159⁹⁵

(Add $12.00 shipping.)

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Daisy Wheels . . . $12.95

Now you can have the advantages of a letter quality Daisy Wheel printer and the convenience of a typewriter for one low cost. Use your wordprocessor to type the letters, then with just a push of a button, your typewriter can type the envelopes. This is a fantastic Printer and a fantastic Typewriter. Every student and home business needs this machine. List $299.00 **Sale $159.95**

PRINTER:

Paper width	12 inches
Printing width	10 inches
Cassette ribbons	Correctable film, one-time film, and fabric
Correcting tapes	Lift-off and cover-up
Line space lever	0,1,1-½,and 2
Keyboard selector	I and II
Print pitch	10,12, and 15

KEYBOARD:

Keys/characters	44/96
Automatic carrier return	
Automatic correction	25 ch.
Automatic underline	
Relocate key	
Tabulation	
½ back space key	

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Sale

X-10 POWERHOUSE

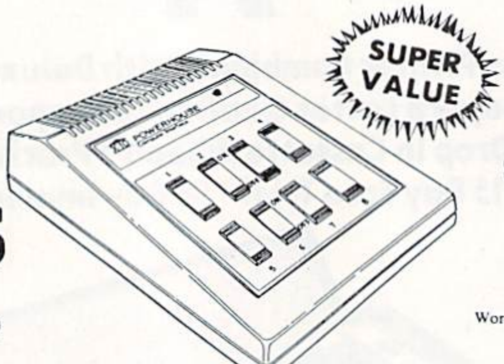
Sale

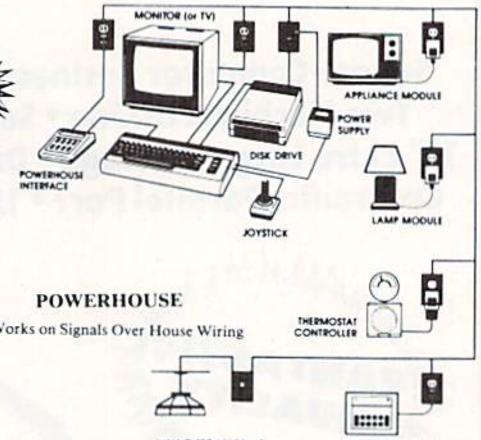
Works as a remote control and a timer for your appliances and lamps without tying up your computer!

For Your IBM Computer

No Wiring!

Includes: Power House Interface plus Computer Software.





POWERHOUSE

Works on Signals Over House Wiring

Sale $39^95

List $69

(Add $3.00 shipping and handling.)

Works on Signals Over House Wiring

The X-10 POWERHOUSE interface is programmed through your computer. The easy to follow software allows you to select a room, the appliances or lights within the room and the time to turn them on or off. Then, when you are done, disconnect the interface from the computer and it works on it's own! Your computer is free to compute and the interface continues to send digital signals over existing wiring to the plug-in-modules (sold separately) connected to the appropriate devices.

Many types of modules are available including appliance modules for TVs, stereos, coffee pots, etc. Lamp modules which contain a dimmer and can be used for incandescent lamps up to 300 watts. Wall switch modules which also contain a dimmer and can be used for incandescent outside lights and ceiling lights of up to 500 watts. 222V heavy duty appliance modules for 220V air conditioners and water heaters. The thermostat controller for central heating and air conditioning. The 3 way wall switch for controlling incandescent lights operated by two switches. The heavy duty wall receptacle module to replace your existing wall receptacle, ect.

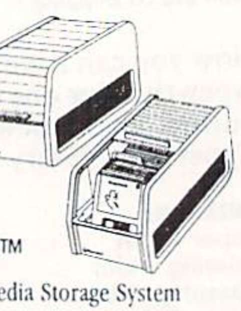
Plus, works with BSR, GE, Leviton, Radio Shack, and Sears Roebuck modules (all 256 codes addressable).

CONTROL MODULES	List	SALE
Lamp Module - 300 watt incandescent	$19.95	**$14.95**
Wall Receptacle - replacement outlets	$24.95	**$19.95**
Wall Switch - 500 watt, dims/brightens	$19.95	**$14.95**
3 Way Wall Switch - incandescent lights, for lights controlled by 2 or more wall switches	$24.95	**$19.95**
Thermostat Controller - controls your exsiting thermostat	$39.95	**$29.95**
2 Pin Appliance Module - up to 500 watts	$19.95	**$14.95**
3 Pin Appliance Module - up to 500 watts	$19.95	**$14.95**

Suncom

Diskit Storage Case (5¼" & 3½")

After keying in data for hours don't you want to be sure your work is protected? The Diskit System does just that. Classically elegant roll-top design combines with a sturdy, practical and professional design. Both **Micro Diskit** (for 3½" Micro Disks) and **Floppy Diskit** (for 5¼" Floppy Disks) hold 60 disks. Please specify size when ordering.



Diskit™

Magnetic Media Storage System

5¼" Floppy Diskit

Sale $22^95

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3½" Micro Diskit

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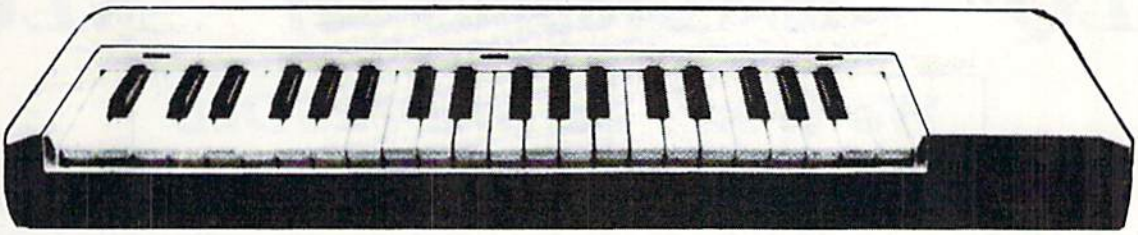
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Full Size Piano/Organ Keyboard

* Requires Conductor Software



SALE

On Sale For Only $49^{95}

List $159

Keyboard — 40 Keys (A-C) guage spring loaded to give the feel and response of a professional polyphonic keyboard instrument. Plugs right into the joystick port of the Commodore 64 or 128. This sturdy instrument comes with carrying handle, protective key cover and built-in music stand. Size: 29'' x 9½'' x 4'' Weight: 9 lbs.

Registers (with the Conductor Software) — Organ • Trumpet • Flute • Harpsicord • Violin • Cello • Bass • Banjo • Mandolin • Callipoe • Concertino • Bagpipe • Synthesizer 1 & 2 • Clavier 1 & 2 • Can be played over a 7 octave range • Programmable sounds

Recording (with the Conductor Software) — Three track sequencer plus over-dubbing with multiple instruments playing at the same time.

(Add $10.00 shipping.*)

The Conductor Software

List $29.95 **Sale $19.95**

The Conductor Software teaches how a compostition is put together, note by note, instrument by instrument. You will learn to play 35 songs from Bach to Rock. Then you will be ready to compose your own songs!

Teaches — Scales • Bass lines • Popular songs from ''Jingle Bells'', ''Bach Minuet'', and Ravel's ''Bolero'' to Micheal Jackson's ''Thriller''.
Features — Sound envelope control with attack, delay, sustain and release times • Records as you play • Playback tracks while you record • Stores songs on disk • Much more
Requires — Above Keyboard • Commodore 64 or 128 with disk drive

(Add $3.00 shipping.*)

The Music Teacher

List $39.95 **Sale $24.95**

This Program teaches a beginner how to read music and play it correctly in rhythm on the keyboard. Features trumpet, organ, violin, synthesizer instrument sounds, built-in metronome, pause-play control and set-up menu for cusomizing the music teacher. (Disk) List $39.95 **Sale $24.95**

The Printed Song

List $29.95 **Sale $19.95**

With this program you can print out, in music notation, your compostition for others to read or play. Requires The Conductor Program and printer compatible with the Commodore graphics mode such most dot matrix printers with a Commodore graphics interface. (Disk) List $29.95 **Sale $19.95**

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10" Printer Sale

Centronics Compatible Parallel Interface

*NLQ** IBM Graphics Set *NLQ**

We Won't Be UNDERSOLD

100 CPS Draft/20CPS Near Letter Quality • Dot Addressable Graphics • Adjustable Tractor and Friction Feed • Automatic Paper Loading • Underline • Right & Left Margin Settings • Pica, Elite, Condensed, Italics • Bold Print • Super & Subscript • Double Strike • Superb NEAR LETTER QUALITY*

$149.95

(Add $10.00 shipping & handling.)

Fantastic Graphics



$149.95

(Add $10.00 shipping & handling.)

2 Year Ltd. Warranty

Easy to Use

The Seikosha 1000 is one of the best values in the United States today. Print your letters, documents, programs, pictures, and more at a blazing 100 Characters Per Second or 20 cps in the Near Letter quality mode. (Looks just like it came from a typewriter.) Plus, choose your printing mode (NLQ, Draft) from your wordprocessor or by simply pushing the controls on the front panel. *Fantastic Quality at a Fantastic Price.* List $349.00 **Sale $149.95**

Print Method
Serial impact dot matrix (9 pin)

Print Speed
Draft- 100 CPS NLQ- 20 CPS

Character Sets
96 ASCII Characters, Symbols (includes italic font)

Ribbon (Life exp.)
Black: cassette (2.5 million characters)

Dimensions
15.4 (W) x 10.9 (D) x 4.7 (H) inch

Weight
Approx. 10 lbs

Interface
Centronics Parallel Port

Line Spacing
1/6, 1/8, 7/72, and 1/216 inch

Paper Feed
Adjustable tractor and friction feed

Printing Direction
Bi-directional

Copies
2 plus original

Centronics Parrallel Interfaces

IBM $24.95 • Apple II $44.95 • Laser 128 $19.95 • Commodore $29.95 • Atari $39.95

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Famous Seikosha National Brand

Hi-Speed Printer

☆ 300 CPS Draft - 50 CPS NLQ ☆

*NLQ**

Optional Color Printing Kit

List $199.95 **Sale $99.95**

*NLQ**

Sale

$359.00

List $599

(Add $10.00 shipping & handling.)

Sale

$359.00

List $599

(Add $10.00 shipping & handling.)



Save

Sale

Hi-Speed Printing (300 CPS Draft) With Minimum Noise • Superb * Near Letter Quality • Variety of Characters and Graphics • IBM and Epson Modes • Built-in 10K Buffer • Built-in Parallel & Serial Interface Ports • Automatic Paper Loading and Ejection • Download Character Setting • Front Panel Margin Setting • Bottom Feed • Optional Easy Handling 7-Color Printing Kit On Sale For $99.95

Print Method
Impact Dot Matrix

Print Speed
Draft- 300 CPS NLQ- 50 CPS

Character Sets
185 Characters Kinds, 8 International Fonts, 256 Download Characters

Dimensions
18.5 (W) x 14.1 (D) x 5.5 (H) inch

Weight
Approx. 19 lbs

Printing Direction
Bi-directional

Ribbon (Life exp.)
Black: cassette (8 million characters)

Line Spacing
7/72", 1/8", 1/6", n/216", n/144", n/72"

Paper Feed
Adjustable tractor and friction feed

Replacement Ribbons
Black . . . . Sale $14.95
4-Color . . . . Sale $19.95

Centronics Parrallel Interfaces

IBM $24.95 • Apple II $44.95 • Laser 128 $19.95 • Commodore $29.95 • Atari $39.95

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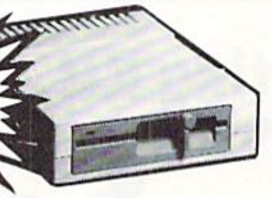
Anti-Static Keyboard Cleaner

Clean your computer keyboard in a fast, efficient and safe manner. The keyboard cleaning solution is exclusively formulated to remove skin oils, dust and dirt that can destroy your equipment. The non-residue solution with anti-static properties will not build up like ordinary household cleaners, so clean as much as you like without worry. Plus the lint free, high absorbency, non-abrasive cloths will not scratch or mar your equipment. (Shipping same as software.*) List $19.95 **Sale $9.95**



Sale $9.95
List $19.95

Disk Drive Cleaner



Sale $9.95
List $19.95

- *60% of all drive downtime is the result of poorly maintained drives.*
- *Drives should be cleaned each week regardless of use due to sensitivity to smoke, dust and all micro particles.*
- *Regularly performed maintenance is the best way of ensuring error free use.*

This unique twin slot jacket design gives twice as many "wet-dry" cleanings per rotation as other leading brands. Non abrasive, 100% lint free, random fiber cleaners capture disk oxide build up, dust and smoke particles. This will insure you against disk and data loss from dirty disk drive heads. Just like you must clean your tape player, your must clean your disk drive. 24 cleanings per kit. (Shipping same as software.*) List $19.95 **Sale $9.95**

TV/Monitor Screen Restorer & Cleaning Kit

Reduce eye fatigue by increasing the clarity of your TV or monitor screen. This kit contains a hard wax formulation to cover surface imperfections on video screens. This restores optical clarity, making what you see more distinct. Plus the high absorbency cloths and anti static spray allow you to clean your screen on a regular basis to keep it looking better than new. This is highly recommended for people who view screens for extended lengths of time. (Shipping is same as software.*) List $19.95 **Sale $9.95**



Sale $9.95
List $19.95

Get Organized With This Elegant Solid Oak Computer Desk And Printer Stand

Specifically designed for the home computer user, this table and stand will fit just about anywhere. The genuine oak, sealed and with a lacquer topcoat, is compatible with any decor. The metal to metal connections provide an easy and sturdy assemble with greater strength and durability.

(Add $15.00 shipping.*)

Ready to Assemble



Solid Oak



Ready to Assemble

Solid Oak Desk

Sale $99.95

List $199.95

Solid Oak Stand

Sale $59.95

List $129.95

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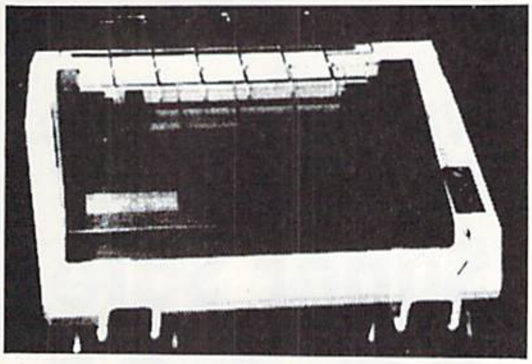
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ComStar 1500 Printer Sale

15" NLQ Printer Sale

Wide Carriage Business Printer For The Price Of a 10" Carriage Printer!



Price Break Thru

- **120 CPS Print Speed**
- **Near Letter Quality Print Mode**
- **IBM Graphics Printer Compatible**
- **136 Column Wide Carriage**
- **Uses Inexpensive Spool Ribbons**

• Premium Quality
• Terrific Price

(Add $10.00 shipping & handling.)

Sale $239.95

List $499

SPECIFICATIONS

Printing Method
Impact Dot Matrix

Printing Speed
120 Characters per secon (at 10 CPI)

Print Buffer Size
816 Bytes

Paper Feed
10 Lines/second (at 1/5 inch line spacing);
Sprocket or Friction Feed

Character Sets
96 Std. ASCII; 96 NLQ ASCII
83 Special & 50 Block Graphic Characters

Character Matrix
9 x 9 Standard Character;
12 x 6 Block Graphics;
8 dot x 60 dot/in. : 8 dot x 120 dot/in. :
8 dot x 240 dot/in. Bit Image Modes.

Line Spacing
1/6, 1/8 inch or 7/72 inch standard;
n/72 or n/216 inch programmable

Characters Per Line
Pica — 136 CPL; Condensed — 233 CPL
Pica Expanded — 68 CPL;
Condensed Expanded — 116 CPL

Interfaces
Centronics Parallel

Printing Width
Single Sheets — 5.5 inch to 14.5 inch;
Continuous Paper — 4 inch to 15.5 inch

Copies
Original Plus 2 Copies

Dimensions
H-5.80" W-15.2" D-12.4"

Replacement Ribbons
Black . . . . Sale $4.95

Parallel Interfaces

IBM — $24.95 Apple — $44.95 Laser 128 — $19.95 Commodore — $29.95 Atari — $39.95

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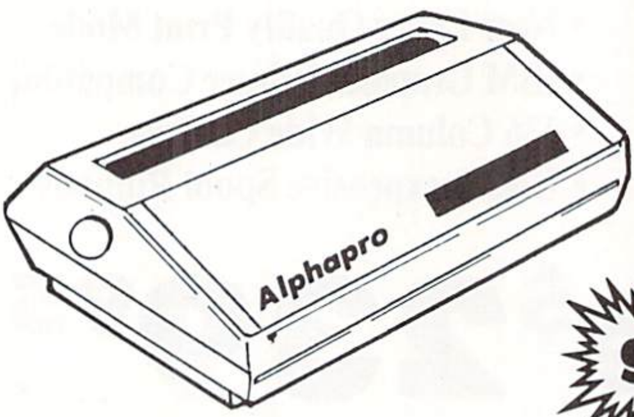
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COMMODARES
PROGRAMMING CHALLENGES
By Dale Rupert

Each month, we'll present several challenges designed to stimulate your synapses and toggle the bits in your cerebral random access memory. We invite you to send your solutions to:

Commodares, c/o *Ahoy!*
P.O. Box 723
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We will print and discuss the cleverest, simplest, shortest, most interesting and/or most unusual solutions. Be sure to identify the *name* and *number* of the problems you are solving. Put *your* name and address on the listings as well. Show sample runs if possible. Briefly describe your solutions and tell what makes them unique or interesting, if they are. You must enclose a stamped, self-addressed envelope if you want any of your materials returned. Solutions received by the middle of the month shown on the magazine cover are most likely to be discussed, but you may send solutions and comments any time. Your original programming problems, suggestions, and ideas are equally welcome. The best ones will become *Commodares!*

PROBLEM #46-1: COLOR BAR

This problem was submitted by Jim Speers (Niles, MI). Write a color selection program which lets the user move a cursor along a color bar to choose screen border, screen, and text colors. All 16 colors should be displayed at once in the color bar. The simpler the better.

PROBLEM #46-2: PHONE CODE

Try this one from Wallace Leeker (Lemay, MO). The telephone keypad is arranged in a matrix like this:

```
      ABC   DEF
 1     2     3

GHI   JKL   MNO
 4     5     6

PRS   TUV   WXY
 7     8     9
```

To enter a stock symbol code, each letter is represented by a two-digit number telling the key number and the letter's position (1, 2, or 3) on that key. For the symbol CBM, C becomes 23 since it is the third letter on the number 2 key, B is 22, and M is 61.

Q is given the code 77 and Z is given the code 99, since those letters aren't on the keypad. Write a program that translates any given three-character stock symbol code into its telephone keypad code.

PROBLEM #46-3: LINE LOCATOR

Write a program which gives the location in memory of any specified program line. If the user enters 20 and the "next line" pointer at the beginning of line 20 stars at memory location 2049, for example, the program returns the value 2049. This month's solutions should be of help.

PROBLEM #46-4: CHARACTER BILLIARDS

Write the simplest program possible which allows a graphics character (such as the letter "O") to move around on the screen like a billiard ball, careening off the screen borders in a never-ending motion. No sprites allowed. This should be the essence of animation.

This month we will look at the most interesting and unusual solutions to *Commodares* from the June 1987 issue of *Ahoy! Problem #42-1: Internal Deletion* was submitted by Andrew P. Thompson (the "Mad Quoter"). The problem was to write a program which deletes one of its own lines after executing it, and then continues running. The solutions were to provide line 30 in this program to meet those requirements:

```
10 PRINT 10
20 PRINT 20
30 (reader's solution...)
40 LIST
```

There were two fundamental approaches to this problem. Several readers sent both types of solutions. The shortest, but least satisfactory, solution merely changes the program line links so that line 10 points to line 30 rather than to line 20.

BASIC program lines are stored in memory as linked lists. The first two bytes of each program line in memory form the link to the next line. (See this month's *Rupert Report* for a discussion of linked lists.)

The solution for the C-64 looks like this:

```
30 POKE 2049,19
```

and for the C-128:

```
30 POKE 7169,19
```

The problems with this solution are that 1) although it appears that line 20 has been deleted, it really hasn't, and 2) the POKE value works only for this exact example. If lines 10 and 20 are not typed exactly as shown, the program will not work, since line 30 will not be in the right place in memory. If you type RUN again, you will see that line 20

is still executed even if it isn't listed. Its disappearance is an illusion.

If you now edit the program or merely type any line number such as 0 and press RETURN, line 20 is relinked, and it reappears if you list the program.

If you delete the space between the PRINT and the 10 in line 10, then run the program, or if you make any other changes to lines 10 or 20, watch out when you run it! The POKE address no longer corresponds to the start of line 30. One bad link can turn a listing into chaos. You can press RUN STOP, then enter 0 as before. Now LIST should give the original program.

The more general solution to this problem actually deletes line 20 by using dynamic keyboard techniques. The idea is to have the program stuff keystrokes into the keyboard buffer so the computer thinks that you have entered the commands which delete line 20 directly.

Several solutions that used the dynamic keyboard method stuffed cursor movement commands into the keyboard buffer. An even better approach is shown by this program from Tim Gaastra (Redlands, CA):

```
1 REM ==================================
2 REM    COMMODARES PROBLEM #42-1 :
3 REM     INTERNAL DELETION
4 REM    SOLUTION BY
5 REM     TIM GAASTRA
6 REM ========= C-64 VERSION =========
7 REM - FOR C-128, REPLACE 631, 638, 198
8 REM      IN LINE 30 WITH 842, 849, 208
9 REM
10 PRINT 10
20 PRINT 20
30 FOR A=631 TO 638:READ B:POKE A,B:NEXT
 :POKE 198,8
35 DATA 50,48,13,82,117,52,48,13:STOP
40 LIST
```

The eight characters put into the keyboard buffer are interpreted as:

50	48	13	82	117	52	48	13
2	0	CR	R	sh-U	4	0	CR

The number 20 is printed followed by a carriage return (CR). Then the abbreviation for RUN 40 (R shift-U 40) is printed, followed by another carriage return. This is done just as if you had entered these characters at the keyboard.

The keyboard buffer begins at address 631 for the C-64 and at address 842 for the C-128. The computer looks to address 198 for the C-64 (208 for the C-128) to find out how many keystrokes are waiting in the buffer. This is why 8 is POKEd into that location.

A STOP or END statement is necessary at the end of line 35 so that the computer goes out and reads the keyboard buffer. Otherwise the computer would finish with line 40 before reading the keyboard. Then there would be a "before" and "after" listing.

Michael Cole (Cambridge, MA) presented an interesting twist. Instead of putting RUN or GOTO into the keyboard buffer, he used the dynamic keyboard to execute POKE 62,8 : CONT after deleting line 20. Normally BASIC won't let a program continue after it has been edited. Michael did some PEEKing around until he found that POKE 62,8 fools the C-64 into thinking that no line has been edited.

One final variation on this problem is this solution from Claude Landusky (Waianae, HI).

```
1 REM ==================================
2 REM    COMMODARES PROBLEM #42-1 :
3 REM     INTERNAL DELETION
4 REM    SOLUTION BY
5 REM     CLAUDE LANDUSKY
6 REM ==================================
10 PRINT 10
20 PRINT 20
30 A=2049 :REM <<< USE A=7169 FOR C-128
31 IF PEEK(A+2)<>10 OR PEEK(A+3)<>0 THEN
 A=PEEK(A)+256*PEEK(A+1) : GOTO 31
32 B=A
33 IF PEEK(B+2)=40 AND PEEK(B+3)=0 THEN
 GOTO 35
34 B=PEEK(B)+256*PEEK(B+1) : C(X)=B : X=
 X+1 : GOTO 33
35 POKEA,PEEK(C(X-2)):POKEA+1,PEEK(C(X-2
 )+1):FOR Y=0 TO X-2:POKE C(Y)+4,143:NEXT
40 LIST
```

Be sure to save this program before you run it. Change the value in line 30 if you are using a C-128. Line 31 looks through memory for the location of line number 10. If A is the starting address of the BASIC program, then the first line number is in addresses A+2 (least significant byte) and A+3 (most significant byte).

Here is a summary of how each BASIC program line is stored in memory:

Address	A	A+1	A+2	A+3	A+4...	A+n
Contents	P0	P1	L0	L1	(program text)	0

P0 and P1 form a pointer to the address of the next line in memory. The pointer value is P0 + 256*P1. L0 and L1 are the line number of the current line. Its value is L0 + 256*L1. Next are the bytes of the program line, followed by one byte of 0. In this example, the value of P0 + 256*P1 (the address of the next program line) would be A+n+1.

Back to Claude's solution. If the current line number is not 10, line 31 uses the pointer in locations A and A+1 to find the start of the next line. The THEN statement in line 31 calculates the address corresponding to this pointer. The next program line is found and its line number is checked.

Once line 10 has been located, line 33 begins the search for line number 40. The array C(X) stores the starting addresses of each of the lines between 10 and 40. The first two POKE statements in line 35 put the starting address of line 40 into the pointer field of line 10, thereby bypassing lines between 10 and 40 (as far as the LIST command

is concerned). This is comparable to the first solution we discussed earlier.

The FOR-NEXT loop in line 35 replaces the first code byte in each program line with character 143, the token for the REMark statement. Since C(Y) is the starting address of a program line, C(Y)+4 is the address of the first byte in the program line. If you run this program, it shows that lines between 10 and 40 are not listed. As we discussed earlier, however, they are still in memory.

If you press 0, then RETURN, the links to lines 20 through 35 are rewritten. Now the list of the program shows the REM statements at the start of the program lines. The REM effectively "deletes" each line from execution. There is quite a lesson in internal BASIC program structure as well as linked lists and pointers to be learned by studying Claude's solution.

Problem #42-2: Cliff Hanger was suggested by Scott McClare (Espanola, ONT). A person is standing at the midpoint of a log 20 units long suspended at its ends from two cliffs. He randomly shuffles left or right. He reaches safety if he ends up 10 units away from his starting position in 25 shuffles or less. After 25 shuffles, he falls off from exhaustion if he hasn't reached safety.

This program from Craig Ewert (Crystal Lake, IL) gives a nice, animated presentation.

```
•1 REM ====================================
•2 REM    COMMODARES PROBLEM #42-2 :
•3 REM      CLIFF HANGER
•4 REM    SOLUTION BY
•5 REM      CRAIG EWERT
•6 REM ====================================
•10 DIM RS$(20):FORI=1TO19:RS$(I)="FELL O
 FF AT POSITION"+STR$(I):NEXT
•20 RS$(0)="SAFE ON LEFT":RS$(20)="SAFE O
 N RIGHT"
•30 SF$(0)="SHUFFLE LEFT":SF$(1)="SHUFFLE
 RIGHT"
•40 T=T+1:X=10:FORI=1TO25:Y=RND(1):X=X+1:
 IF Y<.5 THEN X=X-2
•50 Z=INT(Y*2):IF X=0 OR X=20 THEN I=25:S
 =S+1
•60 PRINT"[CLEAR]S[19"."]S"
•70 PRINT"[HOME]"SPC(X)"*":PRINT SF$(Z)
•80 NEXT:PRINT RS$(X)
•90 PRINT S "SUCCESSES OUT OF" T "TRIES"
•100 GET K$ : IF K$="" THEN 40
•110 GET K$ : IF K$="" THEN 110
•120 GOTO 40
```

I have modified Craig's program to keep track of the number of trials and successes, as well as to let the program run repeatedly. If you press any key during a trial, the action will stop at the end of that trial and display the statistics. Press any key to let the program continue.

Bret Ekstrand (Signal Hill, CA) sent an analysis of this classic random walk problem. The probability that he makes it to the right end of the log can be calculated with this equation:

$$W_N(NR) = \frac{N!}{NR!\ NL!}(0.5)^{NR}(0.5)^{NL}$$

where $W_N(NR)$ is the probability that NR steps out of the total of N steps are to the right. NL is the number of steps taken to the left. N! means "N factorial" where, for example, 5! is 5 * 4 * 3 * 2 * 1 or 120. The 0.5's are the probabilities of each direction being chosen.

For success in this problem, the total number of steps N must be an even number from 10 to 24. Bret calculated W for N=10, 12, ... , 24 with corresponding values of NR=10, 11, ..., 17 and NL=0, 1, ..., 7. Adding up these eight values of W gives 0.0829 as the probability for success on the right side only. Doubling this gives the probability for reaching safety on either side of the log, which is 0.1658 or roughly 1/6.

Therefore he should make it to safety on the average of one out of every six trials based upon these calculations. You may enjoy running some lengthy trials to see if the simulation agrees with the theory. Remember that the BASIC random number generator is not the most random of generators. My trials gave a success rate roughly half of this calculated value. (Can you statisticians provide any explanations?)

Thanks to all the other readers who sent well-written and nicely animated solutions to this problem. The animations included characters who changed color from fatigue as well as poor souls who fell to their demise before your very eyes.

Chris Knack (Pointe Claire, PQ) added these sound effects to his program for the C-128:

```
10 FOR QW=9000 TO 2000 STEP -1000
20 SOUND 1,QW,5 : NEXT
30 SOUND 1,50874,110,1,21163,1557,1
```

You will readily know which sound signals victory and which one signifies the tumble.

This animated version for the C-64 from Jim "The Glitch" Wilson (Buena Park, CA) uses a sprite.

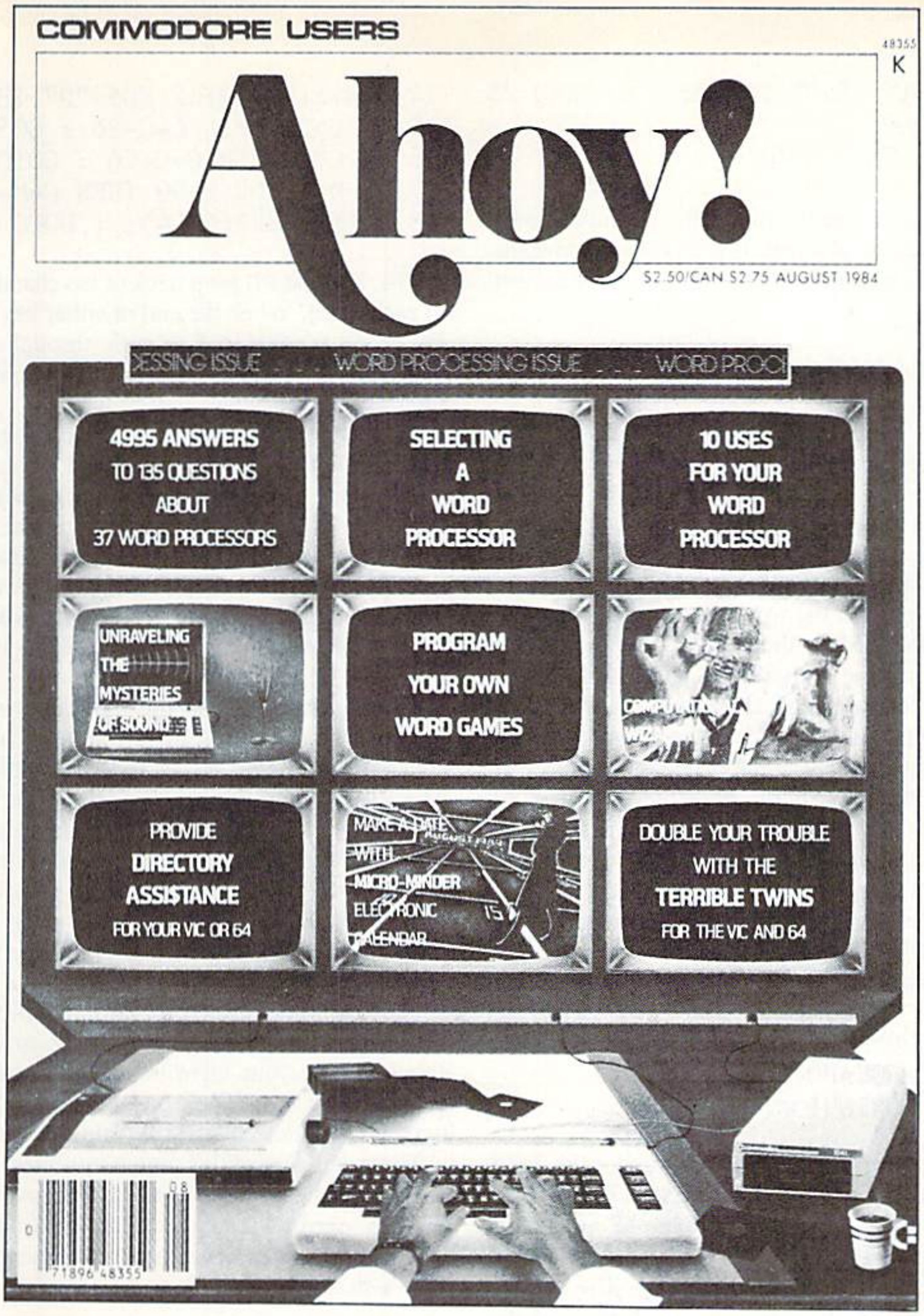
```
·1 REM ================================
·2 REM    COMMODARES PROBLEM #42-2
·3 REM      CLIFF HANGER
·4 REM     SOLUTION BY
·5 REM      JIM WILSON
·6 REM =====   C-64 ONLY  =============
·10 POKE2040,192:POKE53269,1:FORX=12288TO
 12350:POKEX,0:NEXT
·20 FORX=12289 TO 12311 STEP 3:READY:POKE
 X,Y:NEXT:DATA24,24,18,124,88,20,100,0
·30 PRINT"[CLEAR][10"[DOWN]"][c 5][RVSON]
 [14" "][c 4][12"[c +]"][c 5][14" "]";
·40 FORT=1TO13:PRINT"[RVSON][15" "][10"[R
 IGHT]"][15" "]";:NEXT
·50 PRINT"[RVSON][15" "][10"[RIGHT]"][14"
 "][HOME][RVSOFF]";:POKE2023,160:POKE562
 95,12
·60 PRINT"[WHITE][c A][13"[s C]"][c S]"+C
 HR$(13)+"[s B][13" "][s B]"
·70 PRINT"[c Z][13"[s C]"][c X]":X1=172:Y
 1=123
·80 PRINT"[HOME][WHITE]";TAB(16)"[c A][7"
 [s C]"][c S][DOWN][9"[LEFT]"][s B][7" "]
 [s B][DOWN][9"[LEFT]"][c Z][7"[s C]"][c
 X]"
·90 POKE53248,X1:POKE53249,Y1
·100 IFINT(RND(1)*2)=1THENX1=X1+4:PRINT"[
 HOME][DOWN][RIGHT][CYAN]SHUFFLE RIGHT":M
 =M+1:GOTO120
·110 X1=X1-4:M=M+1:PRINT"[HOME][DOWN][RIG
 HT][CYAN]SHUFFLE LEFT "
·120 POKE53248,X1
·130 PRINT"[HOME][DOWN][CYAN]"TAB(17)"MOV
 E";M
·140 IFX1<136THENPRINT"[HOME][DOWN][RIGHT
 ][CYAN]SAFE AT LEFT ":GOTO 180
·150 IFX1>208THENPRINT"[HOME][DOWN][RIGHT
 ][CYAN]SAFE AT RIGHT":GOTO 180
·160 IFM=25THENFORX=123TO255:POKE53249,X:
 NEXT:GOTO 180
·170 FOR T=1 TO 150:NEXT:GOTO 100
·180 GET K$ : IF K$="" THEN 180
·190 RUN
```

Press any key after each trial to restart the program.

Quite a few readers tried their hand at *Problem #42-3: Wildcard Word* suggested by Norm Green (Perth, ONT). The problem was to search through a DATA list of words and find all which matched a wildcard search word. The wildcard search word has asterisks in place of some of its letters. Each asterisk represents one missing letter.

This program from Jim Speers (Niles, MI) is a well-written solution to the problem.

```
·1 REM ==================================
·2 REM     COMMODARES PROBLEM #42-3 :
·3 REM       WILDCARD WORD
·4 REM     SOLUTION BY
·5 REM       JIM SPEERS
·6 REM ==================================
·100 NW=10 : DATA LIST,LOOK,LOST,LAZY,LUC
 K,LUCY,PAST,POST,LICK,BOON
·110 FOR I=1 TO NW : READ L$(I) : NEXT
·120 INPUT"ENTER WORD";W$
·130 PRINT W$: K=0 : FOR I=1 TO NW : E=0
·140 REM IF LEN(L$(I))<>LEN(W$) THEN 180
·150 FOR J=1 TO LEN(W$):X$=MID$(W$,J,1):I
 F X$="*" THEN 170
·160 IF X$<>MID$(L$(I),J,1) THEN E=1
·170 NEXT J:IF E=0 THEN PRINT L$(I):K=1
·180 NEXT I:IF K=0 THEN PRINT"NO MATCH FO
 UND"
·190 PRINT"[DOWN]ANOTHER WORD? (Y/N)"
```



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```
•200 GET Z$ : IF Z$="" OR (Z$<>"Y" AND Z$
 <>"N") THEN 200
•210 IF Z$="Y" THEN 120
```

If you change the length of the word list, you must change NW to match the number of words. If your word list contains more than 10 words, you must add a dimension statement such as

```
105 DIM L$(NW)
```

Jim uses two flags, E and K, in his program. If any mismatch exists between the search word and the selected list word, then the E flag is set to 1, and that list word is not printed. Once a match word is found, the K flag is set to 1. This prevents the printing of the "No Match" message.

Jim provides an option within this program. As written, the leftmost letters of each list word are checked up to the length of the search word. If they match that far, the list word is printed. Thus the search word "B*" would match "Be", "Book", and "Bubblegum". If you remove the REM from line 140, only list words the same length as the search word are tested. This is the way the original problem was stated, although DOS allows an asterisk at the end of a word to replace any number of letters.

Problem #42-4: Double Subber was submitted by Danny Faught (Sherman, TX). The idea is to use two key words to encode or decode an input word. Assume the key words are AHOY and ION, and the input word is COMMODARES. Form an alphanumeric addition problem like this:

```
COMMODARES
AHOYAHOYAH
IONIONIONI
```

The key words are repeated or truncated under the input word to match its length. Then the three letters in each column are "added", with results greater than "Z" wrapping back to "A". The first letter of the encoded word would be "C" + A" + "I" (3+1+9) which is "M" (13). The second character is "O" + H" + "O" which is "L" (15+8+15=38; 38−26=12). COMMODARES becomes MLPUEZYFTJ.

Here is a nice, concise solution from Bob Wilcher (Lynchburg, VA).

```
•1 REM ===================================
•2 REM    COMMODARES PROBLEM #42-4 :
•3 REM     DOUBLE SUBBER
•4 REM    SOLUTION BY
•5 REM     BOB WILCHER
•6 REM ===================================
•7 INPUT"ENCODE OR DECODE (E,D)";ED$
•8 IF ED$<"D" OR ED$>"E" THEN 7
•9 INPUT"MESSAGE,CODE1,CODE2";M$,A$,B$
•10 PM=PM+1:IF PM>LEN(M$) THEN END
•11 PA=PA+1:IF PA>LEN(A$) THEN PA=1
•12 PB=PB+1:IF PB>LEN(B$) THEN PB=1
•13 M=ASC(MID$(M$,PM,1)):A=ASC(MID$(A$,PA
 ,1)):B=ASC(MID$(B$,PB,1))
•14 C=M+A+B-192:IF ED$="D" THEN C=M-A+64
•15 IF C>26 THEN C=C-26 : GOTO 15
•16 IF C<0 THEN C=C+26 : GOTO 16
•17 IF M<65 OR M>90 THEN C=M-64
•18 PRINT CHR$(C+64); : GOTO 10
```

PM, PA, and PB keep track of the character position within each word. When the end of either key word is reached, PA or PB is reset to 1 to cycle through that word again. When the end of the input word is reached in line 10, the program is finished.

Line 14 does the encoding or decoding. Lines 15 and 16 take care of the Z to A wraparound. Line 17 adds an interesting touch. It replaces any encoded character outside of the range A through Z with its original value minus 64. The 64 is added back on when the character is printed in line 18. This lets the user enter multiple-word messages and special symbols such as "!" which are displayed unchanged. HAPPY BIRTHDAY!, AHOY,AHOY becomes JQTNA FGTJLBCO!

Jerry Nichols printed the input and key words on the screen, then used the PEEK command to read the screen codes of each letter rather than using the ASC function. The advantage of this method is that the screen codes for A through Z are 1 through 26. No further math is needed. This method works only for the C-64 or the C-128 in 40-column mode. The 80-column mode screen of the C-128 is in a different location and is less easily accessible.

If you want to test your solution of this problem, be sure to encode input "words" A and Z using Z and Z as the two keywords. Some of the programs submitted did not properly handle the wraparound from Z to A. This example should verify your algorithm. The answers to these two problems are A and Z. Z as a keyword is an identity function; it does not change the value of the input word.

That takes care of this month's problems. Keep those solutions and suggestions coming. You have some tough ones to keep you busy until next month. Enjoy them.

The following people not already mentioned this month also sent valid solutions to *Commodares.* ☐

Leif Bloomquist (Dauphin, MB)
Leo Brenneman (Erie, PA)
Matthew Brock (Tucson, AZ)
Sumir Chadha (New York, NY)
Louis Ciavarella
Curt Donofrio (Shelton, CT)
Tom Finley (Hampton, VA)
Thomson Fung (San Diego, CA)
David Hoffner (Brooklyn, NY)
Istvan Kallos (Lynn, MA)
Larry Louks (Freeport, TX)
Chris Martin (Stockton, CA)
Jeff McCreary
Lon Olson (Mesa, AZ)
Louis Schliselfeld (Cheektowaga, NY)
J.H. Smalley (Boulder, CO)
Robert Wempe (Redlands, CA)
Gary White (Barksdale AFB, LA)
Russell Wilson (Fayette, AL)

PROGRAM LISTINGS

Attention new *Ahoy!* readers! You must read the following information very carefully prior to typing in programs listed in *Ahoy!* Certain Commodore characters, commands, and strings of characters and commands will appear in a special format. Follow the instructions and listings guide on this page.

On the following pages you'll find several programs that you can enter on your Commodore computer. But before doing so, read this entire page carefully.

To insure clear reproductions, *Ahoy!'s* program listings are generated on a daisy wheel printer, incapable of printing the commands and graphic characters used in Commodore programs. These are therefore represented by various codes enclosed in brackets [ ]. For example: the SHIFT CLR/HOME command is represented onscreen by a heart. The code we use in our listings is [CLEAR]. The chart below lists all such codes which you'll encounter in our listings, except for one other special case.

The other special case is the COMMODORE and SHIFT characters. On the front of most keys are two symbols. The symbol on the left is obtained by pressing that key while holding down the COMMODORE key; the symbol on the right, by pressing that key while holding down the SHIFT key. COMMODORE and SHIFT characters are represented in our listings by a lower-case "s" or "c" followed by the symbol of the key you must hit. COMMODORE J, for example, is represented by [c J], and SHIFT J by [s J].

Additionally, any character that occurs more than two times in a row will be displayed by a coded listing. For example, [3 "[LEFT]"] would be 3 CuRSoR left commands in a row, [5 "[s EP]"] would be 5 SHIFTed English Pounds, and so on. Multiple blank spaces will be noted in similar fashion: e.g., 22 spaces as [22 " "].

Sometimes you'll find a program line that's too long for the computer to accept (C-64 lines are a maximum of 80 characters, or 2 screen lines long; C-128 lines, a maximum of 160 characters, 2 or 4 screen lines in 40 or 80 columns respectively). To enter these lines, refer to the *BASIC Command Abbreviations Appendix* in your User Manual.

On the next page you'll find our *Bug Repellent* programs for the C-128 and C-64. The version for your machine will help you proofread programs after typing them. (Please note: the *Bug Repellent* line codes that follow each program line, in the whited-out area, should *not* be typed in. See instructions preceding each program.)

On the second page following you will find *Flankspeed*, our ML entry program, and instructions on its use.

Call *Ahoy!* at 212-239-6089 with any problems (if busy or no answer after three rings, call 212-239-0855).

WHEN YOU SEE	IT MEANS	YOU TYPE	YOU WILL SEE	WHEN YOU SEE	IT MEANS	YOU TYPE	YOU WILL SEE
[CLEAR]	Screen Clear	SHIFT CLR/HOME		[BLACK]	Black	CNTRL 1	
[HOME]	Home	CLR/HOME		[WHITE]	White	CNTRL 2	
[UP]	Cursor Up	SHIFT ↑ CRSR ↓		[RED]	Red	CNTRL 3	
[DOWN]	Cursor Down	↑ CRSR ↓		[CYAN]	Cyan	CNTRL 4	
[LEFT]	Cursor Left	SHIFT ← CRSR →		[PURPLE]	Purple	CNTRL 5	
[RIGHT]	Cursor Right	← CRSR →		[GREEN]	Green	CNTRL 6	
[SS]	Shifted Space	SHIFT Space		[BLUE]	Blue	CNTRL 7	
[INSERT]	Insert	SHIFT INST/DEL		[YELLOW]	Yellow	CNTRL 8	
[DEL]	Delete	INST/DEL		[F1]	Function 1	F1	
[RVSON]	Reverse On	CNTRL 9		[F2]	Function 2	SHIFT F1	
[RVSOFF]	Reverse Off	CNTRL 0		[F3]	Function 3	F3	
[UPARROW]	Up Arrow	↑	↑	[F4]	Function 4	SHIFT F3	
[BACKARROW]	Back Arrow	←	←	[F5]	Function 5	F5	
[PI]	PI	π	π	[F6]	Function 6	SHIFT F5	
[EP]	English Pound	£	£	[F7]	Function 7	F7	
				[F8]	Function 8	SHIFT F7	

BUG REPELLENT FOR THE 64 & 128 By BUCK CHILDRESS

Please note: the *Bug Repellent* programs listed here are for *Ahoy!* programs published from the May 1987 issue onward! For older programs, use the older version.

Type in, save, and run *Bug Repellent*. You'll be asked if you want automatic saves to take place. If so, you're prompted for the device, DISK (D) or TAPE (T). You then pick a starting file number, 0 through 99. Next, you enter a name, up to 14 characters long. At this point, *Bug Repellent* verifies your entries and gives you a chance to change them if you want. If no changes are needed, *Bug Repellent* activates itself. (Pressing RETURN without answering the prompts defaults to disk drive and begins your files with "00BACKUP".)

Type NEW and begin entering an *Ahoy!* program. As you enter program lines and press RETURN, a *Bug Repellent* code appears at the top of your screen. If it doesn't match the code in the program listing, an error exists. Correct the line and the codes will match.

If used, automatic saves take place every 15 minutes. When the RETURN key is pressed on a program line, the screen changes color to let you know that a save will begin in about three seconds. You may cancel the save by pressing the RUN STOP key. The file number increments after each save. It resets to 00 if 99 is surpassed. After saving, or cancelling, the screen returns to its original color and the timer resets for 15 minutes.

When you've finished using *Bug Repellent*, deactivate it by typing SYS 49152 [RETURN] for the Commodore 64 or SYS 4864 [RETURN] for the Commodore 128.

C-64 BUG REPELLENT

```
·10 PRINTCHR$(147)"LOADING AND CHECKING THE DATA[3"."]":J
=49152
·20 FORB=0TO11:READA:IFA<0ORA>255THEN40
·30 POKEJ+B,A:X=X+A:NEXTB:READA:IFA=XTHEN50
·40 PRINT:PRINT"ERROR IN DATA LINE:"PEEK(64)*256+PEEK(63)
:END
·50 X=0:J=J+12:IFJ<49456THEN20
·60 POKE198,0:POKE49456,0:A$="Y":B$=A$:C$="D":D$="DISK":D
=8:PRINTCHR$(147)
·70 INPUT"DO YOU WANT AUTOMATIC SAVES (Y/N)";A$:PRINT:IFA
$="Y"THEN90
·80 PRINT"NO AUTOMATIC SAVES[3"."]":GOTO150
·90 POKE49456,1:INPUT"DISK OR TAPE (D/T)";C$:IFC$<>"D"THE
ND=1:D$="TAPE"
·100 POKE49457,D:D$=D$+" DRIVE":PRINT:INPUT"FILE NUMBER (
0-99)";N
·110 N$=RIGHT$(STR$(N),2):IFN<10THENN$=CHR$(48)+CHR$(N+48
)
·120 F$="BACKUP":PRINT:INPUT"FILENAME";F$:F$=N$+LEFT$(F$,
14):L=LEN(F$)
·130 POKE49458,L:FORJ=1TOL:POKE49458+J,ASC(MID$(F$,J,1)):
NEXTJ:PRINT
·140 PRINT"SAVING DEVICE ** "D$:PRINT"STARTING WITH ** "F
$
·150 PRINT:INPUT"IS THIS CORRECT (Y/N)";B$:IFB$<>"Y"THEN6
0
·160 POKE770,131:POKE771,164:SYS49152:END
·170 DATA169,79,32,210,255,162,38,160,192,204,3,3,1507
·180 DATA208,10,162,131,160,164,169,70,32,210,255,44,1615
·190 DATA169,78,32,210,255,142,2,3,140,3,3,76,1113
·200 DATA36,193,32,96,165,134,122,132,123,32,115,0,1180
·210 DATA170,240,243,162,255,134,58,144,3,76,150,164,1799
·220 DATA32,107,169,32,121,165,173,0,2,240,5,169,1215
·230 DATA79,141,2,3,76,162,164,169,0,133,2,133,1064
·240 DATA251,133,252,133,254,24,101,20,69,254,230,254,197
5
·250 DATA24,101,21,69,254,170,230,254,164,252,185,0,1724
·260 DATA2,133,253,201,34,208,6,165,2,73,255,133,1465
·270 DATA2,201,32,208,4,165,2,240,8,138,24,101,1125
·280 DATA253,69,254,170,44,198,254,230,252,164,253,208,23
49
·290 DATA213,138,41,240,74,74,74,74,24,105,129,141,1327
·300 DATA44,193,138,41,15,24,105,129,141,45,193,162,1230
·310 DATA0,189,43,193,240,12,157,0,4,173,134,2,1147
·320 DATA157,0,216,232,208,239,169,38,141,2,3,173,1578
·330 DATA48,193,240,23,165,161,201,212,176,4,165,160,1748
·340 DATA240,13,238,32,208,160,0,32,225,255,208,6,1617
·350 DATA32,33,193,76,38,192,232,208,242,200,208,239,1893
·360 DATA32,68,229,169,0,168,174,49,193,32,186,255,1555
·370 DATA173,50,193,162,51,160,193,32,189,255,169,43,1670
·380 DATA166,45,164,46,32,216,255,162,1,189,51,193,1520
·390 DATA168,200,152,201,58,144,2,169,48,157,51,193,1543
·400 DATA201,48,208,3,202,16,234,32,33,193,76,116,1362
·410 DATA164,206,32,208,169,0,170,168,76,219,255,160,1827
·420 DATA1,1,160,0,0,65,72,79,89,33,0,0,500
```

C-128 BUG REPELLENT

```
·10 PRINTCHR$(147)"LOADING AND CHECKING THE DATA[3"."]":J
=4864
·20 FORB=0TO11:READA:IFA<0ORA>255THEN40
·30 POKEJ+B,A:X=X+A:NEXTB:READA:IFA=XTHEN50
·40 PRINT:PRINT"ERROR IN DATA LINE:"PEEK(66)*256+PEEK(65)
:END
·50 X=0:J=J+12:IFJ<5213THEN20
·60 POKE208,0:POKE5213,0:A$="Y":B$=A$:C$="D":D$="DISK":D=
8:PRINTCHR$(147)
·70 INPUT"DO YOU WANT AUTOMATIC SAVES (Y/N)";A$:PRINT:IFA
$="Y"THEN90
·80 PRINT"NO AUTOMATIC SAVES[3"."]":GOTO150
·90 POKE5213,1:INPUT"DISK OR TAPE (D/T)";C$:IFC$<>"D"THEN
D=1:D$="TAPE"
·100 POKE5214,D:D$=D$+" DRIVE":PRINT:INPUT"FILE NUMBER (0
-99)";N
·110 N$=RIGHT$(STR$(N),2):IFN<10THENN$=CHR$(48)+CHR$(N+48
)
·120 F$="BACKUP":PRINT:INPUT"FILENAME";F$:F$=N$+LEFT$(F$,
14):L=LEN(F$)
·130 POKE5215,L:FORJ=1TOL:POKE5215+J,ASC(MID$(F$,J,1)):NE
XTJ:PRINT
·140 PRINT"SAVING DEVICE ** "D$:PRINT"STARTING WITH ** "F
$
·150 PRINT:INPUT"IS THIS CORRECT (Y/N)";B$:IFB$<>"Y"THEN6
0
·160 POKE770,198:POKE771,77:SYS4864:END
·170 DATA32,58,20,169,41,162,19,236,3,3,208,4,955
·180 DATA169,198,162,77,141,2,3,142,3,3,224,19,1143
·190 DATA208,7,32,125,255,79,78,0,96,32,125,255,1292
·200 DATA79,70,70,0,96,162,0,134,251,189,0,2,1053
·210 DATA240,19,201,48,144,9,201,58,176,5,133,251,1485
·220 DATA232,208,238,134,252,165,251,208,3,76,198,77,2042
·230 DATA169,0,166,235,164,236,133,253,133,254,142,47,193
2
·240 DATA20,140,48,20,24,101,22,69,254,230,254,24,1206
·250 DATA101,23,69,254,170,230,254,164,252,185,0,2,1704
·260 DATA133,251,201,34,208,6,165,253,73,255,133,253,1965
·270 DATA201,32,208,4,165,253,240,8,138,24,101,251,1625
·280 DATA69,254,170,44,198,254,230,252,164,251,208,213,23
07
·290 DATA138,41,240,74,74,74,74,24,105,65,141,88,1138
·300 DATA20,138,41,15,24,105,65,141,89,20,32,79,769
·310 DATA20,189,85,20,240,6,32,210,255,232,208,245,1742
·320 DATA174,47,20,172,48,20,24,32,240,255,173,93,1298
·330 DATA20,240,27,165,161,201,212,176,4,165,160,240,1771
·340 DATA17,32,65,20,238,32,208,238,1,214,32,225,1322
·350 DATA255,208,6,32,49,20,76,198,77,232,208,242,1603
·360 DATA200,208,239,32,66,193,173,95,20,162,96,160,1644
·370 DATA20,32,189,255,169,0,170,32,104,255,169,0,1395
·380 DATA174,94,20,168,32,186,255,169,45,174,16,18,1351
·390 DATA172,17,18,32,216,255,162,1,189,96,20,168,1346
·400 DATA200,152,201,58,144,2,169,48,157,96,20,201,1448
·410 DATA48,208,3,202,16,234,32,49,20,141,0,2,955
·420 DATA76,183,77,58,59,32,65,20,206,32,208,206,1222
·430 DATA1,214,169,0,170,168,76,219,255,32,79,20,1403
·440 DATA169,26,141,0,214,173,0,214,16,251,96,162,1462
·450 DATA0,142,0,255,96,19,18,32,32,32,32,146,804
·460 DATA0,1,0,0,65,72,79,89,33,0,0,0,339
```

FLANKSPEED FOR THE C-64 By GORDON F. WHEAT

Flankspeed will allow you to enter machine language *Ahoy!* programs without any mistakes. Once you have typed the program in, save it for future use. While entering an ML program with *Flankspeed* there is no need to enter spaces or hit the carriage return. This is all done automatically. If you make an error in a line a bell will ring and you will be asked to enter it again. To LOAD in a program Saved with *Flankspeed* use LOAD "name",1,1 for tape, or LOAD "name",8,1 for disk. The function keys may be used after the starting and ending addresses have been entered.

f1–SAVEs what you have entered so far.

f3–LOADs in a program worked on previously.

f5–To continue on a line you stopped on after LOADing in the previous saved work.

f7–Scans through the program to locate a particular line, or to find out where you stopped the last time you entered the program. It temporarily freezes the output as well.

```
·100 POKE53280,12:POKE53281,11                              OP
·105 PRINT"[CLEAR][c 8][RVSON][15" "]FLANKSPEED[15" "]";    FP
·110 PRINT"[RVSON][5" "]MISTAKEPROOF ML ENTRY PROGRAM[6" "
]"                                                          JP
·115 PRINT"[RVSON][9" "]CREATED BY G. F. WHEAT[9" "]"       FA
·120 PRINT"[RVSON][3" "]COPR. 1987, ION INTERNATIONAL INC.
[3" "]"                                                     AJ
·125 FORA=54272TO54296:POKEA,0:NEXT                         ND
·130 POKE54272,4:POKE54273,48:POKE54277,0:POKE54278,249:PO
KE54296,15                                                  NP
·135 FORA=680TO699:READB:POKEA,B:NEXT                       FL
·140 DATA169,251,166,253,164,254,32,216,255,96              FF
·145 DATA169,0,166,251,164,252,32,213,255,96                EK
·150 B$="STARTING ADDRESS IN HEX":GOSUB430:AD=B:SR=B        KP
·155 GOSUB480:IFB=0THEN150                                  OE
·160 POKE251,T(4)+T(3)*16:POKE252,T(2)+T(1)*16              AM
·165 B$="ENDING ADDRESS IN HEX":GOSUB430:EN=B               PE
·170 GOSUB470:IFB=0THEN150                                  PG
·175 POKE254,T(2)+T(1)*16:B=T(4)+1+T(3)*16                  GM
·180 IFB>255THENB=B-255:POKE254,PEEK(254)+1                 HG
·185 POKE253,B:PRINT                                        EC
·190 REM  GET HEX LINE                                      ED
·195 GOSUB495:PRINT": [c P][LEFT]";:FORA=0TO8               KD
·200 FORB=0TO1:GOTO250                                      IH
·205 NEXTB                                                  IJ
·210 A%(A)=T(1)+T(0)*16:IFAD+A-1=ENTHEN340                  FA
·215 PRINT" [c P][LEFT]";                                   EG
·220 NEXTA:T=AD-(INT(AD/256)*256):PRINT" "                  II
·225 FORA=0TO7:T=T+A%(A):IFT>255THENT=T-255                 GL
·230 NEXT                                                   GI
·235 IFA%(8)<>TTHENGOSUB375:GOTO195                         FL
·240 FORA=0TO7:POKEAD+A,A%(A):NEXT:AD=AD+8:GOTO195          IM
·245 REM    GET HEX INPUT                                   PA
·250 GETA$:IFA$=""THEN250                                   GA
·255 IFA$=CHR$(20)THEN305                                   GO
·260 IFA$=CHR$(133)THEN535                                  LM
·265 IFA$=CHR$(134)THEN560                                  IG
·270 IFA$=CHR$(135)THENPRINT" ":GOTO620                     HO
·275 IFA$=CHR$(136)THENPRINT" ":GOTO635                     HE
·280 IFA$>"@"ANDA$<"G"THENT(B)=ASC(A$)-55:GOTO295           MI
·285 IFA$>"/"ANDA$<":"THENT(B)=ASC(A$)-48:GOTO295           DJ
·290 GOSUB415:GOTO250                                       JA
·295 PRINTA$"[c P][LEFT]";                                  PK
·300 GOTO205                                                FA
·305 IFA>0THEN320                                           BI
·310 A=-1:IFB=1THEN330                                      BB
·315 GOTO220                                                FA
·320 IFB=0THENPRINTCHR$(20);CHR$(20);:A=A-1                 BF
·325 A=A-1                                                  FK
·330 PRINTCHR$(20);:GOTO220                                 PH
·335 REM LAST LINE                                          CP
·340 PRINT" ":T=AD-(INT(AD/256)*256)                        KH
·345 FORB=0TOA-1:T=T+A%(B):IFT>255THENT=T-255               OD
·350 NEXT                                                   OB
·355 IFA%(A)<>TTHENGOSUB375:GOTO195                         LH
·360 FORB=0TOA-1:POKEAD+B,A%(B):NEXT                        BO
·365 PRINT:PRINT"YOU ARE FINISHED!":GOTO535                 MB
·370 REM BELL AND ERROR MESSAGES                            LM
·375 PRINT:PRINT"LINE ENTERED INCORRECTLY":PRINT:GOTO415    JK
·380 PRINT:PRINT"INPUT A 4 DIGIT HEX VALUE!":GOTO415        PG
·385 PRINT:PRINT"ENDING IS LESS THAN STARTING!":B=0:GOTO41
5                                                           IK
·390 PRINT:PRINT"ADDRESS NOT WITHIN SPECIFIED RANGE!":B=0:
GOTO415                                                     HK
·395 PRINT:PRINT"NOT ZERO PAGE OR ROM!":B=0:GOTO415         DM
·400 PRINT"?ERROR IN SAVE":GOTO415                          JK
·405 PRINT"?ERROR IN LOAD":GOTO415                          IO
·410 PRINT:PRINT:PRINT"END OF ML AREA":PRINT                JO
·415 POKE54276,17:POKE54276,16:RETURN                       BF
·420 OPEN15,8,15:INPUT#15,A,A$:CLOSE15:PRINTA$:RETURN       DH
·425 REM GET FOUR DIGIT HEX                                 IM
·430 PRINT:PRINTB$;:INPUTT$                                 OL
·435 IFLEN(T$)<>4THENGOSUB380:GOTO430                       JD
·440 FORA=1TO4:A$=MID$(T$,A,1):GOSUB450:IFT(A)=16THENGOSUB
380:GOTO430                                                 AK
·445 NEXT:B=(T(1)*4096)+(T(2)*256)+(T(3)*16)+T(4):RETURN    KB
·450 IFA$>"@"ANDA$<"G"THENT(A)=ASC(A$)-55:RETURN            GM
·455 IFA$>"/"ANDA$<":"THENT(A)=ASC(A$)-48:RETURN            NJ
·460 T(A)=16:RETURN                                         IC
·465 REM ADDRESS CHECK                                      OL
·470 IFAD>ENTHEN385                                         HO
·475 IFB<SRORB>ENTHEN390                                    LE
·480 IFB<256OR(B>40960ANDB<49152)ORB>53247THEN395           OB
·485 RETURN                                                 HE
·490 REM ADDRESS TO HEX                                     PM
·495 AC=AD:A=4096:GOSUB520                                  AP
·500 A=256:GOSUB520                                         NF
·505 A=16:GOSUB520                                          LG
·510 A=1:GOSUB520                                           HE
·515 RETURN                                                 JD
·520 T=INT(AC/A):IFT>9THENA$=CHR$(T+55):GOTO530             OC
·525 A$=CHR$(T+48)                                          JI
·530 PRINTA$;:AC=AC-A*T:RETURN                              AA
·535 A$="**SAVE**":GOSUB585                                 IC
·540 OPEN1,T,1,A$:SYS680:CLOSE1                             AB
·545 IFST=0THENEND                                          FB
·550 GOSUB400:IFT=8THENGOSUB420                             PM
·555 GOTO535                                                FI
·560 A$="**LOAD**":GOSUB585                                 PE
·565 OPEN1,T,0,A$:SYS690:CLOSE1                             PO
·570 IFST=64THEN195                                         OI
·575 GOSUB405:IFT=8THENGOSUB420                             CO
·580 GOTO560                                                GN
·585 PRINT" ":PRINTTAB(14)A$                                KA
·590 PRINT:A$="":INPUT"FILENAME";A$                         IO
·595 IFA$=""THEN590                                         HK
·600 PRINT:PRINT"TAPE OR DISK?":PRINT                       HL
·605 GETB$:T=1:IFB$="D"THENT=8:A$="@0:"+A$:RETURN           NP
·610 IFB$<>"T"THEN605                                       KO
·615 RETURN                                                 PH
·620 B$="CONTINUE FROM ADDRESS":GOSUB430:AD=B               DD
·625 GOSUB475:IFB=0THEN620                                  NK
·630 PRINT:GOTO195                                          HN
·635 B$="BEGIN SCAN AT ADDRESS":GOSUB430:AD=B               FK
·640 GOSUB475:IFB=0THEN635                                  LN
·645 PRINT:GOTO670                                          HI
·650 FORB=0TO7:AC=PEEK(AD+B):GOSUB505:IFAD+B=ENTHENAD=SR:G
OSUB410:GOTO195                                             LM
·655 PRINT" ";:NEXTB                                        LE
·660 PRINT:AD=AD+8                                          CD
·665 GETB$:IFB$=CHR$(136)THEN195                            JD
·670 GOSUB495:PRINT": ";:GOTO650                            KE
```

SPRAY-CAM
FROM PAGE 18

Starting address in hex: C000
Ending address in hex: C997
SYS to start: 49152

Flankspeed **required for entry! See page 95.**

```
C000: 20 CA C5 20 80 C4 20 18 4E
C008: C7 20 69 C1 AD 03 D0 C9 66
C010: 66 D0 09 20 18 C1 20 37 A1
C018: C0 4C 1F C0 20 59 C0 20 5F
C020: FE C1 AD 02 D0 C9 3E D0 3A
C028: 0B 20 ED C0 AD 51 C0 F0 B2
C030: 03 4C A5 C0 4C 0C C0 EE ED
C038: 4F C0 AD 4F C0 D0 F8 EE BE
C040: 50 C0 AD 50 C0 C9 0E D0 B8
C048: EE A9 00 8D 50 C0 60 00 DF
C050: 00 00 00 00 00 00 00 00 50
C058: 00 AD 1E C1 8D 55 C0 A9 33
C060: 70 8D 1E C1 AD BF C1 8D FA
C068: 56 C0 AD BE C1 8D 57 C0 53
C070: A9 00 8D 58 C0 8D BF C1 CF
C078: 8D BE C1 20 18 C1 A0 00 21
C080: C8 C0 00 D0 FB EE BF C1 47
C088: EE 58 C0 AD 58 C0 C9 05 26
C090: D0 E9 AD 55 C0 8D 1E C1 7C
C098: AD 56 C0 8D BF C1 AD 57 71
C0A0: C0 8D BE C1 60 A9 70 8D 77
C0A8: 1E C1 A9 00 8D BE C1 A9 E9
C0B0: 09 8D BF C1 A2 00 A9 07 1C
C0B8: 9D C9 D9 9D F1 D9 9D 19 1A
C0C0: DA E8 E0 05 D0 F0 20 E4 31
C0C8: FF F0 03 4C 03 C0 20 18 05
C0D0: C1 A0 00 20 37 C0 C8 C0 D4
C0D8: 05 D0 F8 EE BF C1 AD BF 85
C0E0: C1 C9 14 D0 E1 A9 09 8D 73
C0E8: BF C1 4C C6 C0 A9 00 8D 75
C0F0: 52 C0 A2 00 BD 00 60 C9 8E
C0F8: 9C F0 12 E8 E0 00 D0 F4 28
C100: EE F6 C0 AD F6 C0 C9 70 46
C108: D0 E8 EE 51 C0 A9 60 8D 5A
C110: F6 C0 A9 00 8D F5 C0 60 16
C118: AD BE C1 85 FB A9 60 85 57
C120: FC AE BF C1 E0 00 F0 10 2F
C128: A5 FB 18 69 14 85 FB A5 86
C130: FC 69 00 85 FC CA D0 F0 A5
C138: A9 C9 85 02 A9 05 85 03 6A
C140: A2 02 A0 04 B1 FB 91 02 CA
C148: 88 10 F9 18 A5 02 69 28 2C
C150: 85 02 A5 03 69 00 85 03 72
C158: 18 A5 FB 69 14 85 FB A5 B6
C160: FC 69 00 85 FC CA 10 DA FE
C168: 60 A2 00 BD CB C1 8D 7A BE
C170: C1 BD D4 C1 8D 7B C1 A9 FA
C178: 08 8D B7 DA E8 E0 09 D0 44
C180: EA AE BD C1 BD CB C1 8D 72
C188: 93 C1 BD D4 C1 8D 94 C1 16
C190: A9 09 8D B7 DA AD F9 07 12
C198: C9 E2 D0 05 A9 0D 8D 2F 8E
C1A0: DB C9 E3 D0 05 A9 0D 8D 44
C1A8: 57 DB C9 E4 D0 05 A9 0D 17
C1B0: 8D 37 DB C9 E5 D0 05 A9 80
C1B8: 0D 8D 5F DB 60 00 00 00 EE
C1C0: 00 00 02 04 06 08 01 03 D8
C1C8: 05 07 08 B7 BF DF E7 2F 4B
C1D0: 37 57 5F AB DA DA DA DA D5
C1D8: DB DB DB DB DB 4E 8E CE CF
C1E0: 0E 60 64 68 6C 02 07 0C 9D
C1E8: 11 4A 52 5A 62 46 4E 56 3E
C1F0: 5E 7F 87 8F 97 02 0C 01 8C
C1F8: 03 0B 0D 05 12 60 AD 00 39
C200: DC C9 7F F0 F8 8D C0 C1 20
C208: C9 7E D0 10 AD BD C1 C9 28
C210: 02 90 09 CE BD C1 CE BD 86
C218: C1 20 69 C1 AD C0 C1 C9 1F
C220: 7D D0 1B AD BD C1 C9 08 88
C228: F0 14 C9 07 D0 07 EE BD 82
C230: C1 20 69 C1 60 EE BD C1 0C
C238: EE BD C1 20 69 C1 AD C0 60
C240: C1 C9 7B D0 15 A2 00 AD 7D
C248: BD C1 DD C1 C1 F0 0B E8 0E
C250: E0 05 D0 F3 CE BD C1 20 69
C258: 69 C1 AD C0 C1 C9 77 D0 C5
C260: 15 A2 00 AD BD C1 DD C6 E9
C268: C1 F0 0B E8 E0 05 D0 F3 B9
C270: EE BD C1 20 69 C1 AD C0 98
C278: C1 C9 6F D0 03 4C 89 C2 DF
C280: 20 37 C0 A9 00 8D C0 C1 52
C288: 60 AD BD C1 C9 04 90 43 B7
C290: AD BD C1 C9 08 D0 03 4C AF
C298: 1F C4 AD BD C1 C9 04 D0 48
C2A0: 04 A2 E2 A0 00 AD BD C1 F7
C2A8: C9 05 D0 04 A2 E4 A0 0A 7E
C2B0: AD BD C1 C9 06 D0 04 A2 25
C2B8: E3 A0 0F AD BD C1 C9 07 4A
C2C0: D0 04 A2 E5 A0 05 8E F9 4C
C2C8: 07 8C BE C1 20 69 C1 20 48
C2D0: 59 C0 60 20 37 C0 AD BD CE
C2D8: C1 C9 00 D0 2B AD 03 D0 E1
C2E0: C9 42 D0 EE AD 02 D0 C9 F6
C2E8: 46 F0 E7 A0 00 CE 00 D0 48
C2F0: CE 02 D0 AD 02 D0 C9 FF DC
C2F8: D0 05 A9 00 8D 10 D0 20 07
C300: 37 C0 C8 C0 04 D0 E6 60 9D
C308: AD BD C1 C9 01 D0 29 AD A7
C310: 03 D0 C9 42 D0 BC AD 02 2D
C318: D0 C9 3E F0 B5 A0 00 EE 27
C320: 00 D0 EE 02 D0 AD 02 D0 33
C328: D0 05 A9 03 8D 10 D0 20 39
C330: 37 C0 C8 C0 04 D0 E8 60 CF
C338: A2 00 AD 02 D0 DD DD C1 D8
C340: F0 06 E8 E0 04 D0 F3 60 2A
C348: 8E 53 C0 BD E1 C1 8D 1E F7
C350: C1 AD BD C1 C9 02 D0 65 41
C358: AD 03 D0 C9 66 D0 0C AD 94
```

```
C360: BF C1 C9 2F D0 01 60 EE FB
C368: BF C1 60 A0 00 EE 03 D0 AD
C370: 20 37 C0 C8 C0 04 D0 F5 DC
C378: A2 00 AD 03 D0 DD E9 C1 26
C380: F0 06 E8 E0 04 D0 F3 60 6A
C388: 8E 54 C0 AE 53 C0 BD F1 9E
C390: C1 8D BA C3 A9 04 8D BB 55
C398: C3 AE 54 C0 E0 00 F0 17 09
C3A0: 18 AD BA C3 69 28 8D BA BE
C3A8: C3 B0 03 4C B1 C3 EE BB 8C
C3B0: C3 CE 54 C0 4C 99 C3 A9 AB
C3B8: 9E 8D 00 60 60 AD BF C1 D4
C3C0: F0 04 CE BF C1 60 AD 03 17
C3C8: D0 C9 42 F0 51 A0 00 CE 57
C3D0: 03 D0 20 37 C0 C8 C0 04 4A
C3D8: D0 F5 A2 00 AD 03 D0 DD A1
C3E0: ED C1 F0 06 E8 E0 04 D0 26
C3E8: F3 60 8E 54 C0 AE 53 C0 A3
C3F0: BD F1 C1 8D 1C C4 A9 04 7E
C3F8: 8D 1D C4 AE 54 C0 E0 00 0D
C400: F0 17 18 AD 1C C4 69 28 40
C408: 8D 1C C4 B0 03 4C 13 C4 4E
C410: EE 1D C4 CE 54 C0 4C FB 0D
C418: C3 A9 20 8D 00 60 60 AD A1
C420: 03 D0 C9 66 D0 F8 A9 0F A6
C428: 8D 18 D4 A9 81 8D 12 D4 42
C430: AE BF C1 E8 AD 1E C1 8D 64
C438: 7E C4 A9 00 8D 7D C4 E0 D5
C440: 00 F0 15 18 AD 7D C4 69 B7
C448: 14 8D 7D C4 B0 03 4C 54 80
C450: C4 EE 7E C4 CA 4C 3F C4 62
C458: A9 00 8D 52 C0 20 59 C0 DC
C460: 20 37 C0 EE 52 C0 AD 52 7A
C468: C0 C9 0A D0 F0 A9 00 8D F5
C470: 18 D4 8D 12 D4 AE BE C1 01
C478: E8 E8 A9 9D 9D 00 60 60 EF
C480: A2 00 8A 9D 00 38 9D C0 E1
C488: 38 E8 E0 C0 D0 F5 A2 00 B4
C490: BD 47 C5 9D 00 38 E8 E0 FA
C498: 0F D0 F5 A2 00 BD 56 C5 EA
C4A0: 9D 80 38 9D C0 38 9D 00 2B
C4A8: 39 9D 40 39 E8 E0 18 D0 AB
C4B0: EC A2 00 BD 6E C5 9D 98 68
C4B8: 38 BD 85 C5 9D D8 38 BD 66
C4C0: 9C C5 9D 18 39 BD B3 C5 49
C4C8: 9D 58 39 E8 E0 17 D0 E3 8D
C4D0: A9 E0 8D F8 07 A9 E2 8D 03
C4D8: F9 07 A9 00 8D 51 C0 8D B0
C4E0: BE C1 8D BF C1 8D BD C1 7D
C4E8: A2 00 BD 1C C5 9D 00 D0 99
C4F0: E8 E0 2B D0 F5 A2 00 BD 0D
C4F8: 03 C5 9D 00 D4 E8 E0 19 17
C500: D0 F5 60 00 00 00 00 00 27
C508: 00 00 00 00 00 00 00 00 08
C510: 00 80 FF 00 00 80 80 80 12
C518: 00 00 00 00 3E 3D 3E 42 14
C520: 00 00 00 00 00 00 00 00 20
C528: 00 00 00 00 03 1B 00 00 46
C530: 00 03 D8 00 1D 00 00 02 2B
C538: 02 00 00 00 0B 00 02 06 4D
C540: 01 03 06 07 07 07 07 0A 70
C548: FF E8 2E 80 AE 2A 80 AA E3
C550: 2B BF BA 3A C0 28 30 C0 0A
C558: 00 30 C0 00 30 C0 00 30 6A
C560: C0 00 30 C0 00 30 C0 00 03
C568: 30 C0 00 35 C0 00 15 40 A4
C570: 00 05 00 00 0A 00 00 02 81
C578: 00 00 2A A0 00 4A A0 00 2E
C580: 4A A0 00 2A A0 15 40 00 8B
C588: 05 00 00 0A 00 00 08 00 9F
C590: 00 0A 00 00 2A 80 00 2F 74
C598: 80 00 2A 80 15 40 00 05 1E
C5A0: 00 00 0A 00 00 08 00 00 B2
C5A8: AA 80 00 AA E0 00 AA E0 EA
C5B0: 00 AA 80 35 40 00 05 00 56
C5B8: 00 0A 00 00 08 00 00 0A D4
C5C0: 00 00 2A 80 00 2A 80 00 16
C5C8: 2A 80 AD 0E DC 29 FE 8D C1
C5D0: 0E DC A5 01 29 FB 85 01 0E
C5D8: A2 00 BD 00 D0 9D 00 30 D7
C5E0: E8 E0 00 D0 F5 EE DC C5 03
C5E8: EE DF C5 AD DF C5 C9 37 D1
C5F0: D0 E6 A9 30 8D DF C5 A9 5F
C5F8: D0 8D DC C5 A5 01 09 04 AD
C600: 85 01 AD 0E DC 09 01 8D B6
C608: 0E DC A2 00 BD 18 C6 9D CF
C610: 00 34 E8 E0 00 D0 F5 60 35
C618: AA AB AE BA AE AB AA AA 87
C620: AA EA BA AE BA EA AA AA 1A
C628: AA AE AE AE BF AE AA AA A2
C630: AA BA FE BA BA BA AA AA 1A
C638: AA AA BE D7 D7 BE AA AA 10
C640: AA BA EE FE EE EE AA AA C6
C648: AA FE EA EA EA FE AA AA 07
C650: AA FE EA FA EA FE AA AA 1F
C658: AA BA BA BA BA BA AA AA FD
C660: AA EE FE EE EE EE AA AA 1B
C668: AA FE EE FE EA EA AA AA 2B
C670: AA FE EE FA EE EE AA AA 37
C678: AA FE EA FE AE FE AA AA 0F
C680: AA EE EE EE BA BA AA AA C2
C688: AA EE EE EE FE EE AA AA 43
C690: AA EE EE BA BA BA AA AA 9E
C698: AA AA AA BE AA AA AA AA 02
C6A0: FD FD F7 F7 DF DF 7F 7F 4B
C6A8: 7F 7F DF DF F7 F7 FD FD 53
C6B0: 55 55 55 55 55 55 55 55 5B
C6B8: 00 00 C0 C0 F0 F0 FC FF 19
C6C0: 00 00 03 03 0F 0F 3F FF 24
C6C8: 82 82 82 82 82 82 82 82 DC
C6D0: AA BF E0 38 0E 02 FF AA 0F
C6D8: AA FE 0B 2C B0 80 FF AA 95
C6E0: AA BF E0 38 0E 02 FF FF 74
C6E8: D5 FF 5D FF D5 FF 5D FF 4F
C6F0: 75 FF 57 FF 75 FF 57 FF 8A
C6F8: 65 8A D7 A0 65 0A D7 2A D2
```

IMPORTANT! Letters on white background are **Bug Repellent** line codes. **Do not enter them!** Pages 93 and 94 explain these codes and provide other essential information on entering *Ahoy!* programs. Refer to these pages **before** entering any programs!

```
C700: 5D D7 75 5D D7 75 5D D7 8A
C708: C3 C3 C3 C3 C3 C3 C3 C3 26
C710: AA AA AA AA AA AA AA AA 65
C718: A9 99 20 D2 FF A9 93 20 AB
C720: D2 FF A2 00 A9 A0 9D 68 E5
C728: 05 9D 67 06 9D E8 06 E8 AD
C730: E0 00 D0 F2 A2 00 A9 0B 2C
C738: 9D A0 D9 9D A6 D9 18 8A 11
C740: 69 28 AA E0 C8 D0 EF A2 89
C748: 00 A9 0B 9D A1 D9 9D 41 F4
C750: DA A9 A0 9D 1D 05 9D 25 F7
C758: 05 9D 2D 05 9D 35 05 9D A2
C760: 45 05 9D 4D 05 9D 55 05 92
C768: 9D 5D 05 A9 0F 9D C9 D9 62
C770: 9D F1 D9 9D 19 DA E8 E0 35
C778: 05 D0 CE A2 01 A9 98 9D A0
C780: 55 04 E8 A9 97 9D 55 04 FA
C788: E8 E0 23 D0 F0 A2 00 A9 83
C790: 09 9D 50 D8 A9 0A 9D F0 A2
C798: D8 9D 18 D9 9D 40 D9 E8 A1
C7A0: E0 28 D0 EB A9 94 8D F5 28
C7A8: 04 8D FD 04 8D 05 05 8D 61
C7B0: 0D 05 A9 95 8D F9 04 8D 1B
C7B8: 01 05 8D 09 05 8D 11 05 FD
C7C0: A2 00 BD 53 C9 9D 8E 06 70
C7C8: BD 5E C9 9D 06 07 BD 69 80
C7D0: C9 9D 7E 07 BD 74 C9 9D 57
C7D8: B6 06 9D DE 06 9D 2E 07 EA
C7E0: 9D 56 07 A9 9F 9D 66 06 2F
C7E8: 9D A6 07 A9 08 9D 8E DA EC
C7F0: 9D 06 DB 9D 7E DB 9D B6 BC
C7F8: DA 9D DE DA 9D 2E DB 9D 70
C800: 56 DB 9D A6 DB E8 E0 0B 27
C808: D0 B8 A9 82 8D E1 06 8D C0
C810: 59 07 A9 83 8D E5 06 8D A4
C818: 5D 07 A9 84 8D AB 07 A9 94
C820: 99 8D 57 04 8D 5F 04 8D 21
C828: 67 04 8D 6F 04 A2 00 A9 E0
C830: 0E 9D 7F D8 9D A7 D8 9D EF
C838: CF D8 E8 E0 19 D0 F2 8D 15
C840: F7 D8 8D FF D8 8D 07 D9 E5
C848: 8D 0F D9 A0 00 A2 00 A9 AB
C850: 9A 9D 00 60 C8 C0 06 D0 49
C858: 05 A0 00 4C 72 C8 AD 50 83
C860: C8 C9 9B F0 08 A9 9B 8D 5A
C868: 50 C8 4C 72 C8 A9 9A 8D DA
C870: 50 C8 E8 E0 00 D0 D8 EE EB
C878: 53 C8 AD 53 C8 C9 70 D0 69
C880: CC A9 60 8D 53 C8 A9 00 AA
C888: 8D 52 C8 A2 00 A9 20 9D 3B
C890: B4 70 E8 E0 00 D0 F8 A2 EB
C898: 00 A9 91 9D 00 70 9D 14 93
C8A0: 70 9D 50 70 9D 78 70 A9 9F
C8A8: 92 9D 28 70 9D 3C 70 9D 59
C8B0: 64 70 BD 7F C9 9D DC 70 77
C8B8: BD 84 C9 9D 04 71 BD 89 1F
C8C0: C9 9D 2C 71 BD 8E C9 9D 79
C8C8: 54 71 E8 E0 05 D0 CA A9 A2
C8D0: 01 8D 42 71 A9 00 8D 54 9E
C8D8: C0 20 E7 C8 EE 54 C0 AD 1C
C8E0: 54 C0 C9 0A D0 F3 60 20 0F
C8E8: 2C C9 BD E1 C1 8D 2A C9 C1
C8F0: A9 00 8D 29 C9 20 37 C0 33
C8F8: AD 1B D4 C9 2D B0 F6 8D C2
C900: 53 C0 C9 02 90 EF 18 AD 26
C908: 29 C9 69 14 8D 29 C9 B0 A9
C910: 03 4C 17 C9 EE 2A C9 CE F1
C918: 53 C0 AD 53 C0 D0 E7 20 C6
C920: 2C C9 BD E5 C1 AA A9 9C 6C
C928: 9D 00 60 60 20 37 C0 AD 4C
C930: 1B D4 8D 52 C0 C9 40 B0 7B
C938: 03 A2 00 60 AD 52 C0 C9 C8
C940: 80 B0 03 A2 01 60 AD 52 78
C948: C0 C9 C0 B0 03 A2 02 60 4C
C950: A2 03 60 9F 8C 8A 8B 85 1E
C958: 8F 90 86 85 89 9F 9F 9F EC
C960: 9F 8D 88 87 8E 9F 9F 9F 0B
C968: 9F 9F 9F 8B 87 8A 85 88 F2
C970: 8B 9F 9F 9F 9F 84 9F 80 1F
C978: 9F 9F 9F 81 9F 84 9F 20 BC
C980: 01 0C 0C 20 03 0C 05 01 CE
C988: 12 10 12 05 13 13 20 0B 13
C990: 05 19 20 00 00 00 00 00 CE
```

A RAINBOW OF DATA STRUCTURES

FROM PAGE 20

LINKED LIST SHOWOFF

```
•10 REM ==========================          GC
•20 REM  LINKED LIST SHOWOFF                NK
•30 REM    RUPERT REPORT #46                OH
•40 REM ==========================          BI
•50 NUM=50  :REM  NUMBER OF ODD INTEGERS    JN
•60 DIM NFO(2*NUM),LNK(2*NUM),A(2*NUM)      IJ
•70 REM - CREATE LINKED LIST OF 50 ODD      BK
•80 REM     INTEGERS FROM 1 TO 99           KI
•90 T0=TI                                   DH
•100 PRINT"WORKING ON LINKED LIST [3"."]"   KE
•110 FOR K=1 TO NUM                         LC
•120 LNK(K)=K+1 : NFO(K)=2*K-1 : NEXT       ND
•130 LNK(K-1)=-1 :REM  LAST LINK            CK
•140 REM                                    BN
•150 REM - INSERT EVEN INTEGERS N INTO      JG
•160 REM    LIST WITH SUBSCRIPTS 51-100     DD
•170 NXT=NUM+1 : PREV=1 : N=2               CG
•180 OLDLNK=LNK(PREV) : LNK(PREV)=NXT       JA
•190 NFO(NXT)=N : LNK(NXT)=OLDLNK           FG
•200 PREV=PREV+1 : N=N+2                    BP
•210 NXT=NXT+1:IF LNK(NXT-1)<>-1 THEN 180   KE
```

```
·220 REM                                  GN
·230 REM - DELETE ODD INTEGERS FROM LIST  FM
·240 REM    THEY HAVE SUBSCRIPTS 1-50     CD
·250 FIRST=LNK(1) :REM MOVE FIRST POINTER JA
·260 K=FIRST : LNK(1)=-1                  MP
·270 OLDLNK=LNK(K) : LNK(K)=LNK(OLDLNK)   FK
·280 LNK(OLDLNK)=-1                       MF
·290 K=K+1 : IF LNK(K)<>-1 THEN 270       NK
·300 REM                                  LK
·310 REM - PRINT LINKED LIST              HH
·320 K=FIRST                              ML
·330 PRINT NFO(K);                        KJ
·340 K=K+1 : IF LNK(K-1)<>-1 THEN 330     OI
·350 TL=(TI-T0)/60 : PRINT                KN
·360 PRINT "LINKED LIST TOOK "TL"SECONDS" KC
·370 REM ============================     AI
·380 REM - CREATE ARRAY OF 50 ODD         EC
·390 REM     INTEGERS FROM 1 TO 99        DD
·400 T0=TI                                FK
·410 PRINT : PRINT"WORKING ON ARRAY [3"."
 ]"                                       DI
·420 FOR K=1 TO NUM                       PP
·430 A(K)=2*K-1 : NEXT                    AC
·440 REM                                  EG
·450 REM -INSERT EVEN INTEGERS N WITH     IH
·460 REM    SUBSCRIPTS 2-100 BY 2'S       HB
·470 P=2 :REM POINTER TO NEXT ELEMENT     OF
·480 REM - MOVE ALL ITEMS UP              OH
·490 FOR K=NUM+1 TO P+1 STEP -1           IN
·500 A(K)=A(K-1) : NEXT                   AN
·510 REM - INSERT NEW INTEGER             KI
·520 A(P)=P : P=P+2 :IF P<=2*NUM THEN 490 JM
·530 REM - DELETE ODD INTEGERS            JA
·540 P=1 : LAST=NUM*2                     CJ
·550 REM - MOVE ALL ITEMS DOWN            OE
·560 FOR K=P TO LAST-1                    LD
·570 A(K)=A(K+1) : NEXT                   FN
·580 LAST=LAST-1 : P=P+1                  KB
·590 IF LAST>=NUM THEN 560                NE
·600 REM - PRINT ARRAY                    DD
·610 REM                                  PF
·620 FOR K=1 TO NUM                       LC
·630 PRINT A(K); : NEXT                   OO
·640 TA=(TI-T0)/60 : PRINT                KL
·650 PRINT "ARRAY TOOK " TA "SECONDS"     FL
```

PLATFORMS
FROM PAGE 16

Starting address in hex: C000
Ending address in hex: CA27
SYS to start: 49152

***Flankspeed* required for entry! See page 95.**

```
C000: A9 8E 20 D2 FF A9 08 20 FC
C008: D2 FF A9 A6 85 39 A9 C6 5A
C010: 85 3A A9 80 85 3B A9 3B 9F
C018: 85 3C A2 0E A0 00 B1 39 16
C020: 91 3B C8 C0 40 90 F7 18 57
C028: 98 65 39 85 39 A5 3A 69 67
C030: 00 85 3A 18 98 65 3B 85 C6
C038: 3B A5 3C 69 00 85 3C CA 4B
C040: D0 DA A0 18 B9 CD C5 99 8B
C048: 00 D4 88 10 F7 A9 E6 A0 DE
C050: C5 20 1E AB A9 00 8D 17 4E
C058: D0 8D 1B D0 8D 20 D0 8D AE
C060: 21 D0 A9 FC 8D 1D D0 A9 1E
C068: 07 8D 25 D0 A9 09 8D 26 59
C070: D0 A9 0A 8D 27 D0 A9 FF 24
C078: 8D 1C D0 8D 15 D0 20 D5 5C
C080: C4 A9 33 8D 17 04 A9 00 74
C088: 8D 35 C5 A0 1E A9 00 99 13
C090: 46 C5 88 10 FA A2 01 A0 74
C098: 00 18 20 F0 FF A9 17 85 08
C0A0: 02 A9 3E A0 C6 20 1E AB DB
C0A8: C6 02 D0 F5 A0 05 A9 EF 77
C0B0: 99 FA 07 AD 1B D4 29 70 83
C0B8: 18 69 46 99 48 C5 AD 1B F0
C0C0: D4 29 07 AA BD B9 C5 99 47
C0C8: 29 D0 29 01 99 4E C5 BE 59
C0D0: AD C5 A9 00 9D 77 D8 B9 95
C0D8: B3 C5 9D 77 04 A9 07 9D B9
C0E0: 78 D8 A9 57 9D 78 04 88 D5
C0E8: 10 C4 A9 18 8D 36 C5 A9 B2
C0F0: 00 8D 3E C5 A9 F4 8D F8 A7
C0F8: 07 AD 48 C5 8D 46 C5 A9 FE
C100: FF 8D 5B C5 AD 8D 02 D0 BC
C108: FB E6 04 A5 04 29 0F D0 A1
C110: 0B AD 62 C5 F0 06 CE 62 19
C118: C5 20 A2 C4 AD 5E C5 F0 28
C120: 06 CE 5E C5 4C 39 C1 38 98
C128: A9 28 ED 35 C5 8D 5E C5 94
C130: 20 3A C2 20 06 C2 20 69 BF
C138: C4 AD 5F C5 D0 06 20 A1 68
C140: C2 4C 55 C1 A5 04 29 0F 48
C148: D0 0B AE 46 C5 E8 E0 FB A4
C150: B0 03 8E 46 C5 AD 46 C5 58
C158: C9 50 B0 07 C9 3F 90 03 C6
C160: 20 D2 C3 20 0A C5 20 35 5C
C168: C4 AD 62 C5 D0 50 AD 46 18
C170: C5 C9 F9 90 36 A9 06 8D FD
C178: 00 D4 8D 01 D4 A2 20 8E 02
C180: 04 D4 E8 8E 04 D4 A9 14 67
C188: 20 02 C5 A9 03 8D 01 D4 80
C190: A2 20 8E 04 D4 E8 8E 04 36
C198: D4 A9 3C 20 02 C5 CE 17 21
C1A0: 04 AD 17 04 C9 31 B0 2B 44
C1A8: 4C D6 C1 AD 5B C5 C9 0A 30
C1B0: 90 0C A0 05 BE AD C5 BD E2
C1B8: 78 04 C9 57 D0 03 4C 04 7A
C1C0: C1 88 10 F0 20 04 C4 AC A1
C1C8: 35 C5 C8 C8 C0 28 B0 03 F1
C1D0: 8C 35 C5 4C 8B C0 A9 00 9A
C1D8: 85 C6 A2 03 A0 0E 18 20 B1
C1E0: F0 FF EE 86 02 A0 00 B9 A3
```

```
C1E8: 67 C6 F0 EE 20 D2 FF 84 6E
C1F0: 02 A9 02 20 02 C5 20 E4 8B
C1F8: FF C9 00 D0 06 A4 02 C8 09
C200: 4C E7 C1 4C 7E C0 A0 05 27
C208: BE 4E C5 18 B9 48 C5 7D 38
C210: 8A C5 C9 44 90 16 C9 B8 97
C218: B0 12 85 02 AD 1B D4 0D 0D
C220: 1B D4 F0 08 A5 02 99 48 92
C228: C5 4C 36 C2 B9 4E C5 49 4A
C230: 01 29 01 99 4E C5 88 10 A1
C238: CF 60 AD 47 C5 C9 1E B0 BB
C240: 37 AD 1B D4 29 07 C9 06 15
C248: B0 56 CD 5D C5 F0 51 AA 2D
C250: 8E 5D C5 18 BD 38 C5 69 3F
C258: 13 8D 37 C5 BD 40 C5 69 23
C260: 00 8D 3F C5 AD 1B D4 29 B9
C268: 07 AA BD B9 C5 8D 28 D0 DD
C270: A9 FF 8D 5C C5 8D 47 C5 64
C278: 29 0F 4A 4A 09 F8 8D F9 CE
C280: 07 AC 5D C5 18 AD 47 C5 2A
C288: 6D 5C C5 8D 47 C5 38 E9 D4
C290: 15 D9 48 C5 B0 0A A9 02 F3
C298: 8D 5C C5 A9 32 99 54 C5 D7
C2A0: 60 AD 5B C5 C9 0A 90 28 5C
C2A8: AD 00 DC 29 10 F0 03 4C AC
C2B0: 6E C3 8D 5A C5 8D 5B C5 3F
C2B8: AD 00 DC 29 0C 4A 4A 8D 9A
C2C0: 60 C5 AA BD 91 C5 D0 03 7A
C2C8: AD F8 07 09 03 8D F8 07 10
C2D0: AC 5B C5 A5 04 39 75 C5 BC
C2D8: D0 0E 18 AD 46 C5 79 7F 82
C2E0: C5 C9 FB B0 03 8D 46 C5 B9
C2E8: A5 04 29 0F D0 2E AC 60 D6
C2F0: C5 18 AD 36 C5 79 89 C5 41
C2F8: AA AD 3E C5 79 8D C5 D0 F2
C300: 0D E0 15 90 0D 8E 36 C5 2B
C308: 8D 3E C5 4C 1C C3 E0 4D F3
C310: 90 F3 AD 60 C5 49 03 29 DD
C318: 03 8D 60 C5 18 AD 5A C5 B4
C320: 69 03 A8 AD 5B C5 69 00 6D
C328: C9 0A B0 06 8C 5A C5 8D EC
C330: 5B C5 A0 05 38 AD 46 C5 E8
C338: F9 48 C5 C9 03 B0 2B 38 21
C340: AD 36 C5 F9 95 C5 AD 3E 2B
C348: C5 F9 9B C5 90 1C AD 36 F9
C350: C5 F9 A1 C5 AD 3E C5 F9 23
C358: A7 C5 B0 0E B9 54 C5 D0 29
C360: 08 A9 FF 8D 5B C5 8C 61 AE
C368: C5 60 88 10 C7 60 AC 61 5D
C370: C5 B9 48 C5 8D 46 C5 A5 3D
C378: 04 29 1F D0 54 AD 00 DC 74
C380: 29 0C 4A 4A AA BD 91 C5 0A
C388: F0 3F 18 AD 36 C5 7D 89 81
C390: C5 85 02 AD 3E C5 7D 8D 9A
C398: C5 85 03 38 A5 02 F9 95 56
C3A0: C5 A5 03 F9 9B C5 90 21 1C
C3A8: A5 02 F9 A1 C5 A5 03 F9 54
C3B0: A7 C5 B0 15 A5 03 8D 3E 58
C3B8: C5 A5 02 8D 36 C5 29 0F E7
C3C0: 4A 4A 1D 91 C5 8D F8 07 57
C3C8: 60 AD F8 07 29 FC 8D F8 83
C3D0: 07 60 38 AD 36 C5 E9 12 16
C3D8: 85 02 AD 3E C5 E9 00 4A 46
C3E0: 66 02 46 02 46 02 A6 02 82
C3E8: BD 78 04 C9 57 D0 14 A9 D2
C3F0: 5D 9D 78 04 A9 0B 9D 78 33
C3F8: D8 18 BD 77 04 6D 62 C5 B8
C400: 8D 62 C5 60 A9 00 8D 00 4D
C408: D4 A0 04 A2 10 8E 04 D4 9B
C410: E8 8E 04 D4 A2 00 BD C1 82
C418: C5 8D 01 D4 AD F8 07 29 18
C420: FC 1D C7 C5 8D F8 07 A9 FE
C428: 08 20 02 C5 E8 E0 06 90 78
C430: E5 88 D0 D7 60 A5 04 29 7A
C438: 3F D0 2D A2 05 BD 54 C5 F4
C440: F0 23 29 01 09 EE 9D FA 0F
C448: 07 DE 54 C5 AD 5B C5 C9 E0
C450: 0A 90 12 EC 61 C5 D0 0D EE
C458: A9 01 8D 5F C5 AD F8 07 63
C460: 09 03 8D F8 07 CA 10 D5 AA
C468: 60 AD 64 C5 F0 04 CE 64 C8
C470: C5 60 AD 63 C5 0A 18 6D FC
C478: 63 C5 A8 B9 75 C6 D0 04 15
C480: 8D 63 C5 60 8D 64 C5 A2 F1
C488: 10 8E 04 D4 B9 76 C6 F0 E7
C490: 0D 8D 01 D4 B9 77 C6 8D 86
C498: 00 D4 E8 8E 04 D4 EE 63 10
C4A0: C5 60 AD 09 04 48 A0 04 6E
C4A8: 38 B9 08 04 69 00 C9 3A 14
C4B0: 90 02 A9 30 99 08 04 88 4B
C4B8: 10 EF 68 CD 09 04 F0 0B F7
C4C0: AC 17 04 C8 C0 3A B0 03 FF
C4C8: 8C 17 04 A0 10 8C 0B D4 8D
C4D0: C8 8C 0B D4 60 A0 00 B9 C0
C4D8: 08 04 D9 20 04 F0 05 B0 89
C4E0: 0B 4C F7 C4 C8 C0 06 90 15
C4E8: EE 4C F7 C4 A0 05 B9 08 48
C4F0: 04 99 20 04 88 10 F7 A0 E3
C4F8: 05 A9 30 99 08 04 88 10 16
C500: FA 60 18 65 A2 C5 A2 D0 B4
C508: FC 60 A2 07 8A 0A A8 BD 0A
C510: 46 C5 99 01 D0 BD 36 C5 41
C518: 99 00 D0 AD 10 D0 3D 6D BB
C520: C5 A8 BD 3E C5 29 01 F0 6B
C528: 05 98 1D 65 C5 A8 8C 10 53
C530: D0 CA 10 D8 60 00 00 00 15
C538: 14 4C 84 BC F4 2C 00 00 FA
C540: 00 00 00 00 00 01 00 00 41
C548: 00 00 00 00 00 00 00 00 48
C550: 00 00 00 00 00 00 00 00 50
C558: 00 00 00 00 00 00 00 00 58
C560: 00 00 00 00 00 01 02 04 67
C568: 08 10 20 40 80 FE FD FB 5A
C570: F7 EF DF BF 7F 07 0F 1F AC
C578: 3F 7F 7F 3F 1F 0F 07 FF 2B
C580: FF FF FF FF 01 01 01 01 84
```

```
C588: 01 00 01 FF 00 00 00 FF 8A
C590: 00 00 F4 F0 00 14 4C 84 5B
C598: BC F4 2C 00 00 00 00 00 76
C5A0: 01 35 6D A5 DD 15 4D 00 2A
C5A8: 00 00 00 01 01 02 09 10 C5
C5B0: 17 1E 25 0A 19 32 32 19 AB
C5B8: 0A 0A 03 04 05 0C 08 0D F9
C5C0: 0E 10 20 40 80 40 20 00 20
C5C8: 01 02 03 02 01 00 00 00 D1
C5D0: 00 00 1A 0A 00 32 00 00 27
C5D8: 00 20 00 FF FF 00 00 80 79
C5E0: 00 00 00 00 00 8F 93 1C 20
C5E8: 20 20 53 43 4F 52 45 20 C6
C5F0: 05 30 30 30 30 30 30 20 37
C5F8: 20 20 1E 4C 49 56 45 53 DB
C600: 20 05 33 20 20 20 9C 48 9D
C608: 49 47 48 20 05 30 30 30 96
C610: 30 30 30 0D 20 95 12 31 A6
C618: 30 30 20 20 20 20 32 35 60
C620: 30 20 20 20 20 35 30 30 66
C628: 20 20 20 20 35 30 30 20 5E
C630: 20 20 20 32 35 30 20 20 68
C638: 20 20 31 30 30 00 0D 97 AE
C640: 20 20 DD 20 20 20 20 20 FE
C648: 20 DD 20 20 20 20 20 20 07
C650: DD 20 20 20 20 20 20 DD CC
C658: 20 20 20 20 20 20 DD 20 17
C660: 20 20 20 20 20 DD 00 50 2F
C668: 52 45 53 53 20 41 4E 59 AF
C670: 20 4B 45 59 00 08 21 11 B4
C678: 04 16 1A 04 00 00 04 1D D1
C680: 86 08 21 11 04 16 1A 04 79
C688: 00 00 04 1D 86 08 21 11 6A
C690: 04 1D 86 02 00 00 04 1D 5B
C698: 86 08 21 11 03 00 00 08 64
C6A0: 16 1A 04 00 00 00 00 00 D4
C6A8: 00 00 00 00 00 00 00 00 A8
C6B0: 00 00 00 00 00 00 00 00 B0
C6B8: 00 00 00 00 00 00 00 00 B8
C6C0: 00 00 00 00 00 00 00 00 C0
C6C8: 00 00 00 00 00 00 00 00 C8
C6D0: 15 55 54 1A AA A4 1F FF 18
C6D8: F4 05 FF 50 01 41 40 00 A5
C6E0: 69 00 00 55 00 26 00 00 C5
C6E8: 00 00 00 00 00 00 00 00 E8
C6F0: 00 00 00 00 00 00 00 00 F0
C6F8: 00 00 00 00 00 00 00 00 F8
C700: 00 00 00 00 00 00 00 00 00
C708: 00 00 00 00 00 00 00 00 08
C710: 00 00 00 0A AA A0 0F FF 74
C718: F0 00 FF 00 00 00 00 00 09
C720: 28 00 00 00 00 26 00 00 6E
C728: 00 03 C0 00 02 80 00 02 70
C730: 80 00 00 00 00 01 50 00 02
C738: 01 50 00 09 10 00 00 80 23
C740: 00 03 C0 00 03 C0 00 03 CA
C748: C0 00 03 C0 00 00 C0 00 8D
C750: 03 C0 00 00 00 00 00 00 14
C758: 00 00 00 00 00 00 00 00 58
C760: 00 00 00 00 00 26 00 00 86
C768: 00 03 C0 00 02 80 00 02 B0
C770: 80 00 00 00 00 01 40 00 32
C778: 01 40 00 02 00 00 00 C0 7C
C780: 00 03 C0 00 03 C0 00 03 0B
C788: F0 00 00 F0 00 00 C0 00 2B
C790: 00 00 00 00 00 00 00 00 90
C798: 00 00 00 00 00 00 00 00 98
C7A0: 00 00 00 00 00 26 00 00 C6
C7A8: 00 03 C0 00 02 80 00 02 F0
C7B0: 80 00 00 00 00 01 50 00 82
C7B8: 01 50 00 09 60 00 00 00 73
C7C0: 00 0F C0 00 0F C0 00 0C 6C
C7C8: C0 00 3C F0 00 00 30 00 E6
C7D0: 00 00 00 00 00 00 00 00 D0
C7D8: 00 00 00 00 00 00 00 00 D8
C7E0: 00 00 00 00 00 26 00 00 07
C7E8: 00 03 C0 00 02 80 00 02 31
C7F0: 80 00 00 10 00 01 54 00 D6
C7F8: 25 44 00 01 48 00 00 00 AB
C800: 00 03 C0 00 0F C0 00 3C CF
C808: FC 00 30 0C 00 F0 00 00 32
C810: 00 00 00 00 00 00 00 00 10
C818: 00 00 00 00 00 00 00 00 18
C820: 00 00 00 00 00 26 00 00 46
C828: 00 03 C0 00 02 80 00 02 70
C830: 80 00 00 00 00 05 40 00 F5
C838: 05 40 00 04 60 00 02 00 E3
C840: 00 03 C0 00 03 C0 00 03 CA
C848: C0 00 03 C0 00 03 00 00 CF
C850: 03 C0 00 00 00 00 00 00 14
C858: 00 00 00 00 00 00 00 00 58
C860: 00 00 00 00 00 26 00 00 86
C868: 00 03 C0 00 02 80 00 02 B0
C870: 80 00 00 00 00 01 40 00 32
C878: 01 40 00 00 80 00 03 00 3D
C880: 00 03 C0 00 03 C0 00 0F 17
C888: C0 00 0F 00 00 03 00 00 5B
C890: 00 00 00 00 00 00 00 00 90
C898: 00 00 00 00 00 00 00 00 98
C8A0: 00 00 00 00 00 26 00 00 C6
C8A8: 00 03 C0 00 02 80 00 02 F0
C8B0: 80 00 00 00 00 05 40 00 76
C8B8: 05 40 00 09 60 00 00 00 67
C8C0: 00 03 F0 00 03 F0 00 03 AB
C8C8: 30 00 0F 3C 00 0C 00 00 50
C8D0: 00 00 00 00 00 00 00 00 D0
C8D8: 00 00 00 00 00 00 00 00 D8
C8E0: 00 00 00 00 00 26 00 00 07
C8E8: 00 03 C0 00 02 80 00 02 31
C8F0: 80 00 04 00 00 15 40 00 CA
C8F8: 11 58 00 21 40 00 00 00 C3
C900: 00 03 C0 00 03 F0 00 3F F6
C908: 3C 00 30 0C 00 00 0F 00 8F
C910: 00 00 00 00 00 00 00 00 10
C918: 00 00 00 00 00 00 00 00 18
C920: 00 00 00 00 00 26 02 80 C8
```

IMPORTANT! Letters on white background are **Bug Repellent** line codes. **Do not enter them!** Pages 93 and 94 explain these codes and provide other essential information on entering *Ahoy!* programs. Refer to these pages **before** entering any programs!

```
C928: 00 3A 00 00 20 00 00 B0 33
C930: 00 00 33 00 00 03 80 00 E6
C938: 03 A0 00 02 80 00 3A 00 98
C940: 00 20 00 00 B0 00 00 33 44
C948: 00 00 03 80 00 03 A0 00 6F
C950: 02 80 00 3A 00 00 20 00 2D
C958: 00 B0 00 00 33 00 00 03 3F
C960: 80 00 03 A0 00 26 20 00 CA
C968: 00 B0 00 00 33 00 00 03 4F
C970: 80 00 03 A0 00 02 80 00 17
C978: 3A 00 00 20 00 00 B0 00 83
C980: 00 33 00 00 03 80 00 03 3A
C988: A0 00 02 80 00 3A 00 00 E5
C990: 20 00 00 B0 00 00 33 00 94
C998: 00 03 80 00 03 A0 00 02 C1
C9A0: 80 00 3A 00 00 26 33 00 B4
C9A8: 00 03 80 00 03 A0 00 02 D1
C9B0: 80 00 3A 00 00 20 00 00 8B
C9B8: B0 00 00 33 00 00 03 80 20
C9C0: 00 03 A0 00 02 80 00 3A 21
C9C8: 00 00 20 00 00 B0 00 00 99
C9D0: 33 00 00 03 80 00 03 A0 2B
C9D8: 00 02 80 00 3A 00 00 20 B5
C9E0: 00 00 B0 00 00 26 03 A0 5B
C9E8: 00 02 80 00 3A 00 00 20 C5
C9F0: 00 00 B0 00 00 33 00 00 D4
C9F8: 03 80 00 03 A0 00 02 80 A2
CA00: 00 3A 00 00 20 00 00 B0 0B
CA08: 00 00 33 00 00 03 80 00 BE
CA10: 03 A0 00 02 80 00 3A 00 70
CA18: 00 20 00 00 B0 00 00 33 1C
CA20: 00 00 03 80 00 26 00 00 C9
```

JAM ATTACK
FROM PAGE 34

JAM ATTACK 64

```
·10 REM *** JAM ATTACK 64 *** BUCK CHILDR
ESS ***                                   EP
·20 REM *** P.O. BOX 13575 SALEM, OR 9730
9 ***                                     OA
·30 PRINTCHR$(147)"LOADING AND CHECKING D
ATA LINE:":J=52000                        BM
·40 FORB=0TO11:READA                      MB
·50 IFB=0THENL=PEEK(64)*256+PEEK(63):PRIN
TCHR$(19)TAB(31)L:PRINT                   PF
·60 IFA<0ORA>255THEN80                    FK
·70 POKEJ+B,A:X=X+A:D=D+1:NEXTB:READA:IFA
=XTHEN90                                  PL
·80 PRINT"ERROR IN DATA LINE:"L:END       MG
·90 X=0:J=J+12:IFD<504THEN40              ME
·100 PRINT"THE DATA IS OK[3"."]":PRINT:PR
INT"SYS 52[3"0"] TOGGLES ON AND OFF[3"."
]":END                                    BP
·110 DATA162,203,236,51,3,240,10,169,151,
72,169,77,1543                            JC
·120 DATA160,203,76,58,203,169,237,72,162
,245,169,139,1893                         BL
·130 DATA160,227,141,0,3,140,1,3,104,141,
50,3,973                                  AH
·140 DATA142,51,3,169,0,141,0,2,96,173,0,
2,779                                     EI
·150 DATA206,0,2,201,64,208,35,32,159,204
,32,184,1327                              CF
·160 DATA204,169,13,32,210,255,32,207,255
,201,13,240,1831                          PN
·170 DATA6,32,210,255,76,98,203,169,15,32
,195,255,1546                             DE
·180 DATA32,204,255,76,116,164,201,178,24
0,12,134,251,1863                         BO
·190 DATA162,203,32,39,203,166,251,76,139
,227,165,45,1708                          OA
·200 DATA133,2,165,46,166,43,164,44,76,17
2,203,160,1374                            FI
·210 DATA20,185,174,0,153,32,205,136,16,2
47,165,174,1507                           CO
·220 DATA133,2,165,175,166,193,164,194,32
,144,204,32,1604                          AO
·230 DATA159,204,169,5,162,8,160,0,32,186
,255,169,1509                             AG
·240 DATA5,162,205,160,204,32,189,255,32,
192,255,169,1860                          AI
·250 DATA234,141,40,3,162,5,32,198,255,16
9,35,133,1407                             CF
·260 DATA251,32,207,255,198,251,208,249,1
33,251,32,207,2274                        AI
·270 DATA255,133,252,169,5,32,195,255,32,
184,204,169,1885                          LN
·280 DATA15,32,195,255,32,204,255,169,237
,141,40,3,1578                            JK
·290 DATA169,1,174,30,205,172,31,205,133,
2,134,253,1509                            EF
·300 DATA132,254,169,0,162,252,141,27,205
,230,253,208,2033                         NO
·310 DATA2,230,254,165,253,205,28,205,208
,7,165,254,1976                           BC
·320 DATA205,29,205,240,14,202,208,233,16
2,254,230,2,1984                          AF
·330 DATA208,227,238,27,205,208,222,169,2
10,160,204,32,2110                        MK
·340 DATA30,171,173,27,205,166,2,32,205,1
89,169,229,1598                           HJ
·350 DATA160,204,32,30,171,165,252,166,25
1,32,205,189,1857                         MJ
·360 DATA169,13,32,210,255,173,0,2,201,17
7,208,3,1443                              AA
·370 DATA76,116,164,169,245,160,204,32,30
,171,169,0,1536                           CB
·380 DATA133,198,32,228,255,201,78,240,4,
201,89,208,1867                           BD
·390 DATA245,32,210,255,72,169,13,32,210,
```

```
255,104,201,1798                          GJ
·400 DATA78,208,3,76,116,164,160,20,185,3
2,205,153,1400                            HG
·410 DATA174,0,136,16,247,76,237,245,141,
29,205,165,1671                           PC
·420 DATA2,141,28,205,142,30,205,140,31,2
05,96,169,1394                            AN
·430 DATA0,133,144,169,8,32,12,237,169,24
0,32,185,1361                             NM
·440 DATA237,165,144,16,237,104,104,162,5
,76,55,164,1469                           DB
·450 DATA169,15,168,162,8,32,186,255,169,
0,32,189,1385                             EO
·460 DATA255,32,192,255,162,15,76,198,255
,36,58,85,1619                            OC
·470 DATA61,85,13,80,82,79,71,82,65,77,32
,76,803                                   LP
·480 DATA69,78,71,84,72,32,61,32,0,13,66,
76,654                                    MH
·490 DATA79,67,75,83,32,70,82,69,69,32,61
,32,751                                   OB
·500 DATA0,13,80,82,79,67,69,69,68,32,87,
73,719                                    NH
·510 DATA84,72,32,84,72,69,32,83,65,86,69
,63,811                                   OG
·520 DATA32,40,89,47,78,41,32,0,65,72,83,
0,579                                     FP
```

JAM ATTACK 128

```
·10 REM *** JAM ATTACK 128 *** BUCK CHILD
RESS ***                                  IJ
·20 REM *** P.O. BOX 13575 SALEM, OR 9730
9 ***                                     OA
·30 PRINTCHR$(147)"LOADING AND CHECKING D
ATA LINE:":J=4864                         AD
·40 FORB=0TO11:READA                      MB
·50 IFB=0THENL=PEEK(66)*256+PEEK(65):PRIN
TCHR$(19)TAB(31)L:PRINT                   LB
·60 IFA<0ORA>255THEN80                    FK
·70 POKEJ+B,A:X=X+A:D=D+1:NEXTB:READA:IFA
=XTHEN90                                  PL
·80 PRINT"ERROR IN DATA LINE:"L:END       MG
·90 X=0:J=J+12:IFD<564THEN40              OO
·100 PRINT"THE DATA IS OK[3"."]":PRINT:PR
INT"SYS 4864 TOGGLES ON AND OFF[3"."]":E
ND                                        KN
·110 DATA162,19,236,51,3,240,10,169,116,7
2,169,45,1292                             LD
·120 DATA160,19,76,26,19,169,78,72,162,24
5,169,63,1258                             OG
·130 DATA160,77,141,0,3,140,1,3,104,141,5
0,3,823                                   BN
·140 DATA142,51,3,169,0,141,0,2,96,173,0,
2,779                                     EI
·150 DATA206,0,2,201,64,208,30,32,239,20,
169,13,1184                               GJ
·160 DATA32,210,255,32,15,21,32,207,255,2
01,13,240,1513                            LH
·170 DATA6,32,210,255,76,66,19,32,36,21,7
6,55,884                                  BG
·180 DATA77,201,178,240,12,134,251,162,19
,32,7,19,1332                             KP
·190 DATA166,251,76,63,77,173,16,18,133,2
50,173,17,1413                            DE
·200 DATA18,166,45,164,46,76,149,19,160,1
6,185,183,1227                            AN
·210 DATA0,153,57,21,136,16,247,32,219,20
,32,204,1137                              JL
·220 DATA247,153,75,21,136,16,247,165,174
,133,250,165,1782                         MA
·230 DATA175,166,193,164,194,32,204,20,32
,239,20,169,1608                          JK
·240 DATA0,162,107,133,199,142,40,3,169,5
,162,8,1130                               FE
·250 DATA160,0,32,186,255,169,5,162,44,16
0,21,32,1226                              OG
·260 DATA189,255,32,192,255,162,5,32,198,
255,169,35,1779                           EJ
·270 DATA133,251,32,207,255,198,251,208,2
49,133,251,32,2200                        LF
·280 DATA207,255,133,252,169,5,32,195,255
,32,204,255,1994                          AC
·290 DATA32,15,21,32,36,21,169,110,141,40
,3,169,789                                JN
·300 DATA1,174,53,21,172,54,21,133,250,13
4,253,132,1398                            JA
·310 DATA254,169,0,162,252,141,50,21,230,
253,208,2,1742                            KN
·320 DATA230,254,165,253,205,51,21,208,7,
165,254,205,2018                          FO
·330 DATA52,21,240,14,202,208,233,162,254
,230,250,208,2074                         FO
·340 DATA227,238,50,21,208,222,32,129,146
,13,80,82,1448                            EO
·350 DATA79,71,82,65,77,32,76,69,78,71,84
,72,856                                   IM
·360 DATA32,61,32,0,173,50,21,166,250,32,
50,142,1009                               MM
·370 DATA32,129,146,13,66,76,79,67,75,83,
32,70,868                                 AL
·380 DATA82,69,69,32,61,32,0,165,252,166,
251,32,1211                               KC
·390 DATA50,142,32,129,146,13,0,173,0,2,2
01,177,1065                               PI
·400 DATA208,3,76,55,77,32,129,146,13,80,
82,79,980                                 LJ
·410 DATA67,69,69,68,32,87,73,84,72,32,84
,72,809                                   JO
·420 DATA69,32,83,65,86,69,63,32,40,89,47
,78,753                                   NE
·430 DATA41,32,0,169,0,133,208,32,228,255
,201,78,1377                              JA
·440 DATA240,4,201,89,208,245,32,210,255,
72,32,129,1717                            DC
·450 DATA146,13,0,104,201,78,208,3,76,55,
```

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77,160,1121                                 NP
•460 DATA16,185,57,21,153,183,0,136,16,24
7,32,224,1270                               LE
•470 DATA20,185,75,21,32,188,247,136,16,2
47,173,55,1395                              LM
•480 DATA21,133,198,173,51,21,174,52,21,1
33,174,134,1285                             OE
•490 DATA175,76,78,245,141,52,21,165,250,
141,51,21,1416                              FH
•500 DATA142,53,21,140,54,21,96,165,198,1
41,55,21,1107                               DO
•510 DATA165,187,166,188,164,199,133,172,
134,173,132,198,2011                        DC
•520 DATA164,183,96,32,69,168,169,0,133,1
44,169,8,1335                               HA
•530 DATA32,62,227,36,144,48,9,169,240,32
,210,228,1437                               CF
•540 DATA165,144,16,230,104,104,162,5,76,
63,77,169,1315                              FN
•550 DATA15,168,162,8,32,186,255,169,0,32
,189,255,1471                               MJ
•560 DATA32,192,255,162,15,76,198,255,169
,15,32,195,1596                             IK
•570 DATA255,76,204,255,36,58,85,61,85,65
,72,83,1335                                 AD
```

C-64 RAMDRIVE
FROM PAGE 36

```
•10 REM 64RAMDRIVE LOADER & CONFIGURATION
 BY ANTHONY BERTRAM                         JC
•20 :                                       EO
•30 C1$="[HOME][8"[DOWN]"]":C2$="[HOME][9
"[DOWN]"]":R$="[RVSON]"                     PD
•40 PRINT"[CLEAR]LOADING UPPER M.L."        AB
•50 L=64536:CS=0                            NJ
•60 READD:IFD=-1THEN75                      KK
•70 POKEL,D:CS=CS+D:L=L+1:GOTO60            IB
•75 IFCS<>126147THENPRINT"[CLEAR] DATA ER
ROR IN UPPER ML DATA!":STOP                 DA
•80 PRINT"[CLEAR][DOWN]"TAB(5)"[RVSON]64R
AMDRIVE CONFIGURATION MENU"                 EI
•90 PRINT"[DOWN] USE CURSOR UP/DOWN KEY T
O HIGHLIGHT                                 JK
•100 PRINT" CHOICE AND PRESS RETURN TO SE
LECT."                                      OJ
•110 A1$="LOCATE LOWER CODE IN CASSETTE B
UFFER[3" "]"                                NF
•120 A2$="LOCATE LOWER CODE IN TOP OF BAS
IC RAM  ":C=2:GOSUB400                      AC
•130 GOSUB370:IFC=1THENSA=828:GOSUB420:GO
TO170                                       JB
•140 TM=PEEK(55)+256*PEEK(56):SA=TM-190:S
H=INT(SA/256):SL=SA-(SH*256)                IM
•150 POKE55,SL:POKE56,SH:VE=SA+23:VH=INT(
VE/256):VL=VE-(256*VH)                      AM
•160 GOSUB420:POKESA+13,VL:POKESA+18,VH     HP
•170 A1$=" LARGER RAM STORAGE AREA 40961
TO 64512"                                   OK
•180 A2$="SMALLER RAM STORAGE AREA 53248
TO 64512":C=2:GOSUB400:GOSUB370             JC
•190 IFC=1THEN210                           KE
•200 POKE65387,0:POKE65388,208:POKE65389,
0:POKE65390,44:SS=1                         CJ
•210 A1$=" [BACKARROW] TO PRECEDE COMMAND
S (NORMAL BASIC)  "                         CO
•220 A2$=" # TO PRECEDE COMMANDS (FAST LO
AD CART)":C=2:GOSUB400:GOSUB370             PO
•230 IFC=1THEN P$=" [BACKARROW]":GOTO250    IB
•240 POKESA+28,35:P$=" #"                   MA
•250 PRINT"[CLEAR][DOWN] 64 RAMDRIVE ACTI
VATED AT ";SA                               KI
•260 SYS SA                                 DA
•270 PRINT:PRINTP$"LOAD  = LOAD FROM RAMD
RIVE                                        JF
•280 PRINTP$"SAVE  = SAVE TO RAMDRIVE       HF
•290 PRINTP$"![5" "]= SCRATCH PROGRAM       KJ
•300 PRINT:PRINT" THE ABOVE REQUIRE A SIX
 CHARACTER                                  DE
•310 PRINT"[3" "]FILENAME ENCLOSED IN QUO
TES.                                        FO
•320 PRINT:PRINTP$"$[5" "]= DIRECTORY":PR
INT:PRINT                                   NE
•330 IFSSTHENB$=" 11,264 ":GOTO350          AI
•340 B$=" 23,551 "                          CJ
•350 PRINTB$"RAM DRIVE STORAGE BYTES FREE
.":PRINT                                    GA
•360 PRINT"SYS 58451 TO KILL. SYS"SA"TO R
E-START":END                                BJ
•370 GETA$:IFA$=CHR$(13)THENRETURN          CJ
•380 IFA$="[DOWN]"THENGOSUB400:GOTO370      IP
•390 GOTO370                                KN
•400 IFC=2THENPRINTR$C1$A1$:PRINTC2$A2$:C
=1:RETURN                                   KH
•410 PRINTC1$A1$:PRINTR$C2$A2$:C=2:RETURN   HD
•420 FORP=SATOSA+188:READA:CK=CK+A:POKEP,
A:NEXT                                      DO
•430 IF CK=23041THENRETURN                  JC
•440 PRINT"[CLEAR] ERROR IN LOWER ML DATA
!":STOP                                     HJ
•490 REM * UPPER ML DATA *                  BL
•1000 DATA 0,0,0,0,0,0,0,0,0,0,32,29,255,
192,6,240,6,169,4,141                       ON
•1010 DATA 254,3,96,202,224,0,208,3,76,32
,253,138,72,165,253,141                     HH
•1020 DATA 24,252,165,254,141,25,252,177,
253,141,26,252,200,177                      ON
•1030 DATA 253,141,27,252,162,1,32,55,255
,165,253,141,28,252,165                     IP
```

```
·1040 DATA 254,141,29,252,160,6,177,253,1
41,30,252,200,177,253                    CE
·1050 DATA 141,31,252,56,173,30,252,237,2
6,252,141,32,252,173                     PJ
·1060 DATA 31,252,237,27,252,141,33,252,1
04,170,160,6,56,177,253                  HP
·1070 DATA 237,32,252,145,253,200,177,253
,237,33,252,145,253,200                  PN
·1080 DATA 56,177,253,237,32,252,145,253,
200,177,253,237,33,252                   NH
·1090 DATA 145,253,202,240,11,160,10,32,6
7,255,136,208,250,76                     JE
·1100 DATA 127,252,173,30,252,133,251,173
,31,252,133,252,173,26                   PP
·1110 DATA 252,133,253,173,27,252,133,254
,173,107,255,141,115                     MP
·1120 DATA 255,173,108,255,141,116,255,32
,74,255,173,28,252,133                   GC
·1130 DATA 251,173,29,252,133,252,173,24,
252,133,253,173,25,252                   AG
·1140 DATA 133,254,173,117,255,141,115,25
5,173,118,255,141,116                    PC
·1150 DATA 255,32,74,255,56,173,107,255,2
37,32,252,141,107,255                    HG
·1160 DATA 173,108,255,237,33,252,141,108
,255,56,173,117,255,233                  KG
·1170 DATA 10,141,117,255,173,118,255,233
,0,141,118,255,206,114                   MI
·1180 DATA 255,76,252,254,177,253,141,107
,255,200,177,253,141                     JF
·1190 DATA 108,255,76,9,253,0,0,0,0,0,0,0
,0,0,0,0,0,0,0,0,0,0                     JJ
·1200 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,173,255,3,201,4                      FK
·1210 DATA 208,93,169,53,133,1,169,125,13
3,253,169,255,133,254                    GB
·1220 DATA 169,6,133,251,133,249,173,136,
2,133,252,169,216,133                    JA
·1230 DATA 250,174,114,255,240,55,160,0,1
77,253,41,63,145,251                     PF
·1240 DATA 173,134,2,145,249,200,192,6,20
8,240,160,10,32,67,255                   MF
·1250 DATA 136,208,250,24,165,251,105,40,
133,251,165,252,105,0                    IF
·1260 DATA 133,252,24,165,249,105,40,133,
249,165,250,105,0,133                    LJ
·1270 DATA 250,202,208,201,169,0,141,254,
3,96,177,122,201,34,240                  OC
·1280 DATA 6,169,8,141,254,3,96,32,115,0,
177,122,201,32,144,241                   HH
·1290 DATA 201,91,176,237,153,118,255,200
,192,7,208,238,136,152                   LA
·1300 DATA 24,101,122,133,122,165,123,105
,0,133,123,160,1,177                     DO
·1310 DATA 122,201,34,208,208,32,115,0,17
3,255,3,201,1,208,55                     AK
·1320 DATA 173,114,255,208,6,169,4,141,25
4,3,96,32,29,255,152                     FL
·1330 DATA 240,244,177,253,133,251,200,17
7,253,133,252,200,177                    DN
·1340 DATA 253,141,115,255,200,177,253,14
1,116,255,165,43,133                     AN
·1350 DATA 253,165,44,133,254,32,74,255,1
69,0,141,254,3,96,201                    OB
·1360 DATA 2,240,3,76,34,252,56,165,45,14
1,115,255,229,43,141                     LG
·1370 DATA 112,255,165,46,141,116,255,229
,44,141,113,255,56,173                   IK
·1380 DATA 109,255,237,112,255,141,111,25
5,173,110,255,237,113                    GK
·1390 DATA 255,13,111,255,176,6,169,1,141
,254,3,96,173,114,255                    JH
·1400 DATA 240,23,201,12,144,3,76,92,254,
32,29,255,192,6,208,6                    CN
·1410 DATA 169,2,141,254,3,96,76,137,254,
169,125,133,253,169,255                  DD
·1420 DATA 133,254,76,147,254,173,117,255
,133,253,173,118,255                     MJ
·1430 DATA 133,254,160,0,185,119,255,145,
253,200,192,6,208,246                    OB
·1440 DATA 32,67,255,136,208,250,173,107,
255,145,253,32,67,255                    OP
·1450 DATA 173,108,255,145,253,32,67,255,
24,173,107,255,109,112                   GP
·1460 DATA 255,145,253,200,173,108,255,10
9,113,255,145,253,32                     PP
·1470 DATA 67,255,32,67,255,165,253,141,1
17,255,165,254,141,118                   LB
·1480 DATA 255,165,43,133,251,165,44,133,
252,173,107,255,133,253                  JC
·1490 DATA 173,108,255,133,254,32,74,255,
238,114,255,32,67,255                    AK
·1500 DATA 165,253,141,107,255,165,254,14
1,108,255,56,169,0,237                   DF
·1510 DATA 107,255,141,109,255,169,252,23
7,108,255,141,110,255                    ML
·1520 DATA 16,8,169,0,141,109,255,141,110
,255,169,0,141,254,3                     CG
·1530 DATA 96,169,125,133,253,169,255,133
,254,174,114,255,160                     PA
·1540 DATA 0,177,253,217,119,255,208,6,20
0,192,6,208,244,96,160                   IJ
·1550 DATA 10,32,67,255,136,208,250,202,2
08,230,96,230,253,208                    PJ
·1560 DATA 2,230,254,96,160,0,177,251,145
,253,230,251,208,2,230                   NO
·1570 DATA 252,230,253,208,2,230,254,165,
251,205,115,255,208,233                  AB
·1580 DATA 165,252,205,116,255,208,226,96
,1,160,255,91,0,0,0,0,0,0,0              LC
·1590 DATA0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
,0,0,0,0,0,0,-1                          AM
·1990 REM * LOWER ML DATA *              ME
·2000 DATA 173,8,3,141,252,3,173,9,3,141 GD
·2010 DATA 253,3,169,83,141,8,3,169,3,141 IP
·2020 DATA 9,3,96,160,1,177,122,201,95,24
```

IMPORTANT! Letters on white background are **Bug Repellent** line codes. **Do not enter them!** Pages 93 and 94 explain these codes and provide other essential information on entering ***Ahoy!*** programs. Refer to these pages **before** entering any programs!

```
0                                          PN
·2030 DATA 3,108,252,3,32,115,0,177,122    HO
·2040 DATA 201,147,240,15,201,148,240,14   AO
·2050 DATA 201,33,240,13,201,36,240,12,10
 8                                         JF
·2060 DATA 252,3,169,1,44,169,2,44,169,3   LB
·2070 DATA 44,169,4,141,255,3,201,4,208    BL
·2080 DATA 11,169,147,32,210,255,162,13    FA
·2090 DATA 24,32,240,255,32,115,0,169,127  PD
·2100 DATA 141,13,220,165,1,141,73,253,16
 9                                         HN
·2110 DATA 0,133,1,162,7,181,248,157,62    NG
·2120 DATA 253,202,208,248,32,80,253,173   MP
·2130 DATA 255,3,201,1,208,14,165,123,201  PJ
·2140 DATA 2,208,8,165,253,133,45,165,254  IP
·2150 DATA 133,46,162,7,189,62,253,149,24
 8                                         HJ
·2160 DATA 202,208,248,173,73,253,133,1    MA
·2170 DATA 169,129,141,13,220,173,254,3    AO
·2180 DATA 240,4,170,76,55,164,173,255,3   JP
·2190 DATA 201,1,208,6,165,123,201,2,208   BO
·2200 DATA 3,108,252,3,32,161,225,76,174,
 167                                       IE
```

EMPIRE
FROM PAGE 47

```
·10 REM  EMPIRE/BY CLEVELAND BLAKEMORE     AE
·20 REM  (C)1986 FOR THE C128 COMPUTER     GG
·30 REM  VERSION 2.6                       EK
·40 COLOR.,1:COLOR4,1:COLOR1,1:COLOR5,3:G
 RAPHIC1,1:GRAPHIC.:PRINTCHR$(11)CHR$(19)
 CHR$(19)CHR$(142)CHR$(147);:GOSUB140      EJ
·50 REM TITLE SCREEN                       CO
·60 PRINTTAB(5)"[c 4][DOWN][DOWN][RVSON][
 s U][3"[s C]"][s I][s U][s C][s I][s U][
 s I][s U][s C][s I][s U][s C][s C][s I][
 s U][s C][s I][s U][s C][s C][s I][SS][s
  U][3"[s C]"][s I]"                       JB
·70 PRINTTAB(5)"[RVSON][s B][s U][s C][s
 C][s K][s B][SS][s J][s K][s J][s K][SS]
 [s B][s B][s U][s I][s B][s B] [s B][s B
 ][s U][s I][s B][SS][s B][s U][s C][s C]
 [s K]"                                    HI
·80 PRINTTAB(5)"[RVSON][s B][s J][s I][SS
 ][SS][s B][SS][s U][s I][s U][s I][SS][s
  B][s J][s K][s B][s B] [s B][s B][
 s J][s K][s J][s I][s B][s J][s I]  "     OF
·90 PRINTTAB(5)"[RVSON][s B][s U][s K][SS
 ][SS][s B][SS][s B][s J][s K][s B][SS][s
  B][s B][s U][s C][s K][s B] [s B][s B][
 s U][s C][s I][s B][s B][s U][s K]  "     FL
·100 PRINTTAB(5)"[RVSON][s B][s J][s C][s
  C][s I][s B][SS][s B][SS][SS][s B][SS][
 3"[s B]"][SS][SS][s B] [3"[s B]"][SS][3"
 [s B]"][s J][s C][s C][s I]"              HE
·110 PRINTTAB(5)"[RVSON][s J][3"[s C]"][s
  K][s J][s C][s K][SS][SS][s J][s C][s K
 ][s J][s K][SS][SS][s J][s C][s K][s J][
 s K][SS][s J][s K][s J][3"[s C]"][s K]"   BF
·120 PRINTTAB(11)"[c 5]A TRADING ADVENTUR
 E":PRINTTAB(8)"BY CLEVELAND M. BLAKEMORE
 ":PRINTTAB(17)"[RVSON][DOWN]C-128[DOWN][
 DOWN]"                                    DI
·130 PRINTTAB(14)"[3"[DOWN]"][RED]PLEASE
 WAIT[3"."]";:GOSUB1470:GOTO180            OO
·140 PRINT"[c 4][c A]";:FORX=.TO36:PRINT"
 [s C]";:NEXT:PRINT"[c S][LEFT]"CHR$(148)
 "[s C]"                                   DG
·150 FORX=.TO22:PRINT"[s B] "TAB(38)"[s B
 ][LEFT]"CHR$(148):NEXT:PRINT"[c Z]";      IP
·160 FORX=.TO36:PRINT"[s C]";:NEXT:PRINT"
 [c X][LEFT]"CHR$(148)"[s C][HOME]":RETUR
 N                                         DL
·170 REM INITIALIZATION                    EI
·180 DIM DX(8),DY(8),A$(60),N(8),S(8,8),T
 (8,8),AP(8),CH(4,8),C(4)                  DP
·190 S=1024:C=55296:L=40:M=42:B=32:X=.:Y=
 .:I=32:K=.:A=I:V=.:J=.:OX=.:OY=.:T=156:B
 R=58:W=37:P=38:F=94:U=47:H=14:SS=.:SC=.:
 CS=500.00:BG=.:WR=.:NI=.:BP=.             HE
·200 DEFFNS(J)=J+X+(Y*L):DEFFNJ(X)=JOY(2)
 AND15:DEFFNO(J)=J+OX+(OY*L):DEFFNN(J)=((
 PEEK(FNS(S))>47ANDPEEK(FNS(S))<58))       AA
·210 DEFFND(J)=(A>47ANDA<58)ORA=5          EI
·220 DEFFNB(J)=(X>39ORX<.ORY>24ORY<.OR(PE
 EK(FNS(S))<>BANDPEEK(FNS(S))<>BRANDPEEK(
 FNS(S))<>WANDPEEK(FNS(S))<>PANDPEEK(FNS(
 S))<>FANDPEEK(FNS(S))<>UANDFNN(.)=.))     MI
·230 FORJ=1TO8:READDX(J),DY(J):NEXT:FORJ=
 1TO60:READA$(J):NEXT                      MJ
·240 HI$=CHR$(18):OF$=CHR$(146):C$="=":L$
 ="":B$="":FORX=.TO39:C$=C$+"#":L$=L$+"[U
 PARROW]":B$=B$+"@":NEXT:MA$="[RVSON][c 5
 ] [s P]ER [s I]TEM[9" "][s C]URRENT [s R
 ]EALM [s V]ALUE ":S$=" SAYS[3"."]"        OP
·250 IA$="[RVSON][c 5] [s T]YPE OF [s C]O
 MMERCE[6" "]# IN [s I]NVENTORY ":PUDEF"0
 "                                         NG
·260 J=FRE(1):FORX=1TO8:READJ:T(X,J)=-1:R
 EADRX:S(X,J)=RX:NEXT:FORJ=1TO8:FORY=.TO7
 :IFT(J,Y)<>-1THENT(J,Y)=INT((RND(1)*8)+1
 ):ELSET(J,Y)=.                            JC
·270 NEXT:NEXT:FORJ=.TO8:READAP(J):NEXT:F
 ORJ=1TO4:FORY=.TO8:READCH(J,Y):NEXT:NEXT
 :FORJ=1TO8:READS(J,8):NEXT:FORJ=1TO4:REA
 DC(J):NEXT                                NF
·280 WINDOW1,21,38,21,1:PRINTTAB(10)"PRES
 S FIRE TO BEGIN";                         LA
·290 X=.:Y=1:DO:POKE8192+32*8+X,.:POKE819
 2+32*8+Y,60:X=X+1+((X=7)*8):Y=Y+1+((Y=7)
```

```
*8):LOOPUNTILJOY(2)>127                         JG
·300 FORX=.TO7:POKE8192+32*8+X,.:NEXT           BI
·310 REM MAIN LOOP                              CB
·320 X=.:Y=.:GOSUB1200:CHAR.,X,Y,"[c 8]*"
 :GOSUB1150:FORSS=1TO4:COLOR4,C(SS):FORSC
 =.TO250                                        HN
·330 J=FNJ(.):OX=X:OY=Y:IFJTHENX=X+DX(J):
 Y=Y+DY(J):IFFNB(.)=.THENI=A:K=V:A=PEEK(F
 NS(S)):V=PEEK(FNS(C)):SOUND1,2000,1:ELSE
 X=OX:Y=OY:FORJ=.TOT:NEXT                       CG
·340 IFA=47THENM=41:ELSEIFA=37ORA=38THENM
 =39:ELSEM=42                                   DM
·350 IFX<>OX OR Y<>OYTHENCHAR.,X,Y,CHR$(M
 ):POKEFNS(C),15:POKEFNO(C),K:POKEFNO(S),
 I                                              CL
·360 H=T-H:PRINTCHR$(H);:IFJOY(2)>127ANDF
 ND(.)THENGOSUB490:GOSUB1200:CHAR.,X,Y,"[
 c 8]*"                                         NJ
·370 NEXT:NEXT:PRINT"[HOME][HOME][CLEAR]"
 ;CHR$(7);:GOSUB950:J=(N(8)/2700)*100           HD
·380 PRINT"[HOME][HOME]"TAB(10)"[c 7][RVS
 ON] [s Y]EAR'S END [s R]ESULTS ":PRINT"[
 RIGHT][RIGHT][DOWN][DOWN][c 8][s Y]OU HA
 VE AQQUIRED [RVSON][c 3]";:PRINTUSING"[3
 "#"]";J;:PRINT"%[RVSOFF][c 8] OF THE [c
 3][s E]MPIRE!":GOSUB1150:GOSUB990:GOTO22
 50                                             BN
·390 REM MENU SUBROUTINE                        FG
·400 PRINTCHR$(147)"[c 8]";TAB(18-(LEN(A$
 )/2))HI$;A$:PRINT:FORIM=.TONM-1:COLOR5,I
 M+2:PRINTTAB(18-(LEN(A$(BM+IM)))/2);A$(B
 M+IM):NEXT:IM=.                                HA
·410 XM=IM:COLOR5,IM+2:CHAR.,(18-(LEN(A$(
 BM+IM))/2)),IM+2,HI$+A$(BM+IM)                 GO
·420 J=JOY(2):IFJ=.THEN420:ELSESOUND1,500
 0,1,.,.,.,.                                    DA
·430 IFJAND128THENSOUND1,15000,20,2,200,9
 000,.:IM=IM+1:XM=FRE(1):RETURN                 LJ
·440 IFJ=5THENIM=IM+1:IFIM=NMTHENIM=.           IN
·450 IFJ=1THENIM=IM-1:IFIM<.THENIM=NM-1         AK
·460 CHAR.,(18-(LEN(A$(BM+XM))/2)),XM+2,O
 F$+A$(BM+XM):PRINT                             HL
·470 GOTO410                                    PE
·480 REM HANDLE INDIVIDUAL LOCATIONS            FF
·490 A=A-48:COLOR4,1:COLOR5,A+1:PRINTCHR$
 (147);B$;CHR$(14):FORJ=1TO23:PRINT"@"TAB
 (39)"@":NEXT:CHAR.,1,17,LEFT$(B$,38):CHA
 R.,39,23,B$:POKE2023,.:POKE56295,A             HO
·500 PRINTCHR$(19);TAB(20-(LEN(A$(A))/2))
 ;HI$;A$(A)                                     JN
·510 A$="[c 5][DOWN][s R]EPRESENTATIVE [c
  8]"+A$(26+A):PRINTTAB(21-(LEN(A$)/2));A
 $                                              KD
·520 PRINTTAB(21-((18+LEN(A$(26+A)))/2)+1
 5);"[WHITE]";LEFT$(L$,LEN(A$(26+A)));"[c
  5]"                                           JB
·530 GOSUB1040:BM=44:NM=6:A$="[s M]ERCHAN
 TRY":GOSUB400:IFIM=6THENE=.:COLOR4,C(SS)
```

```
 :RETURN:ELSEONIMGOSUB550,710,840,880,940
 :GOTO530                                       HB
·540 REM BUY                                    JM
·550 GOSUB1010:GOSUB1060:PRINT"[c 5]";A$(
 26+A);S$:COLOR5,A+1:IFIM=9ANDSGN(CS)=-1T
 HENPRINTCHR$(34);"[s Y]OU CANNOT BUY LAN
 D ON DEBT NOTES.";CHR$(34):RETURN              OE
·560 IFT(A,IM-1)THENPRINTCHR$(34);"[s W]E
  DO NOT DEAL IN ";A$(17+IM);".";CHR$(34)
 :RETURN:ELSEPRINTCHR$(34);"[s H]OW MANY
 WOULD YOU LIKE TO PURCHASE.";CHR$(34)          GI
·570 PRINTCHR$(34);"[s W]E HAVE ";:PRINTU
 SING"[4"#"]";S(A,IM-1);:PRINT" ";A$(17+I
 M);" TO SELL.";CHR$(34)                        PA
·580 PRINT"[c 5][RVSON][s S]ELECT # [s I]
 TEMS [RVSOFF][c 8]";:UL=S(A,IM-1):GOSUB1
 080:PRINT:IFBGTHENNI=BG:ELSECOLOR5,A+1:P
 RINT:PRINTCHR$(34);"[s A]H,WELL[3"."]";C
 HR$(34):RETURN                                 JN
·590 BP=AP(IM-1)+CH(SS,IM-1):IC=INT(BP/8)
 :WR=.:BG=.:ASK=BP+IC*8:DO:PRINT"[c 5]";A
 $(26+A);S$:COLOR5,A+1:PRINTCHR$(34);A$(5
 0.5+RND(1));                                   AE
·600 PRINTUSING"[5"#"]";ASK;:PRINT" EACH.
 ";CHR$(34)                                     HA
·610 PRINT"[RVSON][s Y]OUR [s O]FFER?[c 8
 ] $";:UL=BP+IC*8:GOSUB1080:PRINT:IFBG>=A
 SK-IC*.5THENEXIT:ELSEIFBG>ASK-IC*4THENAS
 K=BG+IC                                        JB
·620 SOUND1,22000,10,2,900,2000,1:COLOR5,
 A+1:IFBG>IC*8THENSR=8:ELSESR=INT(BG/IC)        AB
·630 PRINT:PRINT"[c 5]"A$(26+A);S$:COLOR5
 ,A+1:PRINTCHR$(34);"[s N]AY,";A$(17-SR);
 CHR$(34)                                       CD
·640 WR=WR+1:LOOPUNTILWR=10:PRINT:IFWR=10
 ORBG<ASK-IC*.5THENPRINTCHR$(34);"[s N]AY
 ![s E]NOUGH OF THIS BARGAINING!":RETURN        DG
·650 PRINT"[c 5]";A$(26+A);S$;:COLOR5,A+1
 :PRINT:SOUND1,5000,20,1,10,1000,.:IFBG>I
 C*8THENSR=8:ELSESR=INT(BG/IC)                  PG
·660 IFIM=9ANDSGN(CS-NI*BG)=-1THENPRINTCH
 R$(34);"[s I] DO NOT ACCEPT DEBT NOTES O
 N LAND,MY FRIEND.";CHR$(34):RETURN             DJ
·670 IFCS-NI*BG<-5000THENPRINTCHR$(34);"[
 s T]HE [s M]ERCHANT [s G]UILD CAN ISSUE
 YOU NO  MORE THAN 5[3"0"] DOLLARS WORTH
 OF DEBT  NOTES.";CHR$(34):RETURN               HJ
·680 PRINTCHR$(34);"[s A]YE,";A$(17-SR);C
 HR$(34):PRINT"[WHITE][s S]OLD.":S(A,IM-1
 )=S(A,IM-1)-NI:CS=CS-(NI*BG):N(IM-1)=N(I
 M-1)+NI:SLEEP4:GOSUB940:RETURN                 FP
·690 RETURN                                     EC
·700 REM SELL                                   IB
·710 GOSUB1010:GOSUB1060:IFN(IM-1)=.THENP
 RINT"[c 5]";A$(26+A);S$:COLOR5,A+1:PRINT
 CHR$(34);"[s Y]OU DO NOT HAVE ANY ";A$(1
 7+IM);"!";CHR$(34):RETURN                      NG
·720 NI=INT(N(IM-1)*(T(A,IM-1)*.124))           OK
```

```
730 PRINT"[c 5]";A$(26+A);S$:COLOR5,A+1 LK
740 IFNITHENPRINTCHR$(34);"[s W]E WILL B
UY ";:PRINTUSING"[4"#"]";NI;:PRINT" ";A$
(17+IM);" FROM YOU.";CHR$(34):SLEEP3:ELS
EPRINTCHR$(34);"[s N]O THANKS.";CHR$(34)
:RETURN NM
750 BP=AP(IM-1)+CH(SS,IM-1):IC=INT(BP/8)
:WR=.:BG=.:ASK=BP-IC:DO:PRINT"[c 5]";A$(
26+A);S$:COLOR5,A+1:PRINTCHR$(34);A$(52.
5+RND(1)); FA
760 PRINTUSING"[5"#"]";ASK;:PRINT" EACH.
";CHR$(34) NA
770 BG=.:DO:COLOR5,A+1:PRINT"[RVSON][s Y
]OUR [s O]FFER?[c 8] $";:UL=BP+IC*8:GOSU
B1080:PRINT:LOOPUNTILBG:IFBG<=ASK+(IC*.5
)THENEXIT:ELSEIFBG<=ASK+IC*3THENASK=ASK+
IC OE
780 SOUND1,22000,10,2,900,2000,1:COLOR5,
A+1:IFBG>BP+IC*8THENSR=8:ELSEIFBG>BPTHEN
SR=INT((BG-BP)/IC):ELSESR=. CD
790 PRINT:PRINT"[c 5]";A$(26+A);S$:COLOR
5,A+1:PRINTCHR$(34);"[s N]AY,";A$(9+SR);
CHR$(34):SLEEP3 EF
800 WR=WR+1:LOOPUNTILWR=10:PRINT:IFWR=11
ORBG>ASK+IC*.5THENPRINT:PRINT"[c 5]";A$(
26+A);S$:COLOR5,A+1:PRINTCHR$(34);"[s N]
AY![s E]NOUGH OF THIS BARGAINING!":RETUR
N AK
810 COLOR5,A+1:PRINT:PRINT"[c 5]";A$(26+
A);S$:SOUND1,5000,20,1,10,1000,.:IFBG>BP
+IC*8THENSR=8:ELSEIFBG>=BPTHENSR=INT((BG
-BP)/IC):ELSESR=. EL
820 PRINTCHR$(34);"[s A]YE,";A$(9+SR);CH
R$(34):PRINT"[WHITE][s S]OLD,":S(A,IM-1)
=S(A,IM-1)+NI:T(A,IM-1)=1:CS=CS+(NI*BG):
N(IM-1)=N(IM-1)-NI:SLEEP4:GOSUB940:RETUR
N KM
830 REM SEASONAL CHANGES EI
840 GOSUB1010:GOSUB1060:COLOR5,IM+1:PRIN
TA$(17+IM):FORJ=1TO4:COLOR5,C(J):PRINTHI
$;A$(53+J); KD
850 PRINTUSING"[4"#"]";ABS(CH(J,IM-1));:
PRINTOF$;SPC(2)A$(59+SGN(CH(J,IM-1))) MG
860 NEXT:RETURN KM
870 REM INQUIRE CC
880 GOSUB1010:GOSUB1060 EF
890 IFIM<9THENJ=T(A,IM-1):PRINT"[c 5]"A$
(26+A);S$:COLOR5,A+1:PRINTCHR$(34);A$(35
+J);" DEMAND.";CHR$(34):GOTO910 JB
900 COLOR5,A+1:PRINTS(A,8);"[c 5]FURLONG
S AT ";:COLOR5,A+1:PRINTHI$;"$";AP(8)+CH
(SS,8);"[LEFT][RVSOFF] APIECE." JO
910 GOSUB1040:PRINTMA$:FORJ=.TO8:COLOR5,
J+2:PRINTTAB(1)A$(18+J)TAB(26)"[RVSON]$"
;:PRINTUSING"[4"#"].##";(AP(J)+CH(SS,J)+
RND(1));:IFJ=IM-1THENPRINT"[RVSOFF] [s @
]":ELSEPRINT HN
920 NEXT:PRINTTAB(8)"[c 8][DOWN][s P]RES
S FIRE TO CONTINUE.";:DO:LOOPUNTILJOY(2)
>127:RETURN GE
930 REM INVENTORY AC
940 GOSUB950:GOSUB990:RETURN AA
950 GOSUB1040:PRINTIA$:PUDEF" ":FORJ=.TO
8:COLOR5,J+2:PRINTTAB(1)A$(18+J)TAB(26);
:PRINTUSING"[5"#"]";N(J):NEXT:PUDEF"0" OM
960 PRINTTAB(8)"[c 8][DOWN][s P]RESS FIR
E TO CONTINUE.";:GOSUB1060 NM
970 PRINT"[DOWN]"TAB(13)"[s C]ASH ON [s
H]AND":PRINTTAB(13)"[RVSON] $";:PRINTUSI
NG"[6"#"].##";ABS(CS);:PRINT" ":IFSGN(CS
)=-1THENPRINTTAB(16)"[RED][DOWN]![s D]EB
T!":ELSEPRINTTAB(16)"[WHITE][DOWN][s C]R
EDIT" KM
980 RETURN GF
990 DO:LOOPUNTILJOY(2)>127:RETURN CD
1000 REM COMMERCE TYPE AH
1010 BM=18:NM=9:PRINT"[c 8]":A$=" [s C]O
MMERCE: ":GOSUB400 CI
1020 RETURN IN
1030 REM MAIN DISPLAY WINDOW KE
1040 WINDOW1,5,38,16,1:RETURN DK
1050 REM SET CONVERSATIONAL WINDOW JM
1060 WINDOW1,18,38,23,1:PRINTOF$;:RETURN AE
1070 REM GET VALUE FROM 1-1000 JOYSTICK CI
1080 DO:LOOPUNTILJOY(2)=.:BG=.:DO:PRINTU
SING"[5"#"]";BG;:J=JOY(2) IN
1090 IFJ=1THENBG=BG-10:IFBG<.THENBG=. AP
1100 IFJ=5THENBG=BG+10:IFBG>ULTHENBG=UL OP
1110 IFJ=3THENBG=BG+1:IFBG>ULTHENBG=UL NH
1120 IFJ=7THENBG=BG-1:IFBG<.THENBG=. PF
1130 PRINT"[5"[LEFT]"]";:LOOPUNTILJ>127:
RETURN OH
1140 REM FANFARE AN
1150 R$="V302WGV2044W$BV105W$EV105WFV204
W$BV302WFV302H$EV204H$BV105HGQ$EV204HGV3
02HCV105QGV105HFV204H$BV302HDH$BV203H$BV
104H$B" BA
1160 RE$="V105QGV204H$BV302H$EV105Q$BQFV
204H$BV302QDQCV105Q$EV105HDV202HGV301H$B
HGV202H$EV104H$B" PA
1170 TEMPO 10:VOL8:ENVELOPE.,3,.,15,.,1:
ENVELOPE1,2,3,13,6,.,1 GF
1180 PLAY"V1T0X0V2T0X0V3T1X0":PLAYR$:PLA
YRE$:PLAYRE$:RETURN BJ
1190 REM MASTER MAP NP
1200 PRINT"[HOME][HOME][CLEAR][RVSOFF][4
" "][GREEN](  ([c 5]<[4"[UPARROW]"]<[BAC
KARROW]  [GREEN]([3" "][c 2]] ] [GREEN](
 [3"("][c 4]< <[BACKARROW]< <[BACKARROW]
" IE
1210 PRINT"[8" "][c 5][5"+"] [BACKARROW]
[GREEN]([3" "][c 2]] [GREEN](  ( ( [c 4]
;;[BACKARROW][UPARROW][BACKARROW];[BACKA
RROW][UPARROW][BACKARROW][BACKARROW][GRE
EN]((";  FB
1220 PRINT" ([4" "]( [c 5]+[WHITE][[c 5]
```

```
+[WHITE][[c 5]+ [BACKARROW] [GREEN]((  [
c 2]]  [GREEN]( ( [c 4]< <[BACKARROW] <
<[3"[BACKARROW]"][GREEN] ("                LC
•1230 PRINT"  [c 2]][5" "][c 5]+[BLACK]1[
c 5]+[BLACK]2[c 5]+< [GREEN]([3" "]( ([c
 2]] [GREEN]( ([c 5]++ [c 4][BACKARROW]
[c 5]++ [c 4]< [BLUE][BACKARROW]%%";        KH
•1240 PRINT"[c 2]][3" "]][13" "][GREEN]([
3" "][c 2]][GREEN]([c 2]][GREEN]([BLUE]&
[c 5]++[c 4]<[UPARROW][UPARROW][c 5]++
[c 4]<[BLUE][3"%"]";                        LH
•1250 PRINT"  [GREEN]([c 2]][c 4];  [c 2]
]  ] ][7" "][GREEN](  [c 2]][GREEN]([BLU
E]&&[c 5][7"+"] [c 4]<[BLUE]&[3"%"]";       HO
•1260 PRINT" [c 2]] [c 4]<<>[GREEN]( [c 2
]][4" "]][8" "]][GREEN]([BLUE]%&&[c 5]++
[c 8]$[BLACK]3[c 8]$[c 5]++[c 4]<[BLUE]%
&[3"%"]";                                   BO
•1270 PRINT"  [c 4]<[UPARROW]><[BACKARROW
][c 2]] ] ][11" "]][GREEN]([BLUE]%%&[c 3
][EP][c 2][3":"][c 3][EP][BLUE]&[5"%"]&"
;                                           II
•1280 PRINT"[c 2]] [c 4][3"+"] [BACKARROW
] [c 2]][7" "][c 4][RVSON][sEP]  [s N][R
VSOFF][BACKARROW][3" "][c 2]][GREEN]([BL
UE]%[c 3][EP][c 2][3":"][c 3][EP][BLUE]&
%[c 8][4"<"][BACKARROW] ";                  GO
•1290 PRINT"[c 5]##[c 4]+[c 5]#[c 4]+ [c
5][5"#"]<[BACKARROW][c 2]] [c 4][RVSON][
sEP]  [s N] [RVSOFF][BACKARROW][5" "][c
3][EP][c 2][3":"][c 3][EP][BLUE]&%&[c 8]
+<+<<[BACKARROW]";                          NK
•1300 PRINT" [BLUE][[c 4][3"+"] [BLUE][
[[c 5]<<[3" "][c 4]+[PURPLE]#[c 4]+[RVSO
N] [RVSOFF][sEP]>[8" "][c 2]][BLUE]%&%&[
c 8][4"+"] [BACKARROW]";                    DO
•1310 PRINT"[BLUE][ [c 4]+[PURPLE]@[c 4]+
 [BACKARROW][BLUE][ [c 5]<<[4" "][c 4][3
"+"][sEP]<<>[6" "][YELLOW][EP][BLUE]%&%&
%[c 8]+[WHITE]#[c 8]++ [GREEN][RVSON] ";   JO
•1320 PRINT"[RVSOFF]  [c 4]+[BLACK]6[c 4]
+<  [c 5]<<[3" "][GREEN]([c 4]<+[PURPLE]
#[c 4]+>[3"<"]>[4" "][c 2][PI][5":"][BLA
CK]4[c 8][4"+"] [GREEN][RVSON] ";           MD
•1330 PRINT"[RVSOFF] [BLUE][[4" "][[c 5]<
<[GREEN](  [GREEN]([c 4]<[UPARROW][3"+"]
[UPARROW]>[3"<"][4" "][c 2][PI][BLUE]%%&
%[GREEN][c *][RVSON][c *][c 8][RVSOFF]+[
WHITE]#[c 8]++[GREEN][RVSON][sEP] ";        KF
•1340 PRINT"[RVSOFF][6" "][c 5]<<[4" "][c
 4]<[UPARROW][UPARROW]+[BLACK]5[c 4]+[UP
ARROW][UPARROW]><[5" "][c 8][EP][BLUE]%&
%&%[GREEN][RVSON][7" "]";                   JD
•1350 PRINT"[c 5][RVSOFF]## [3"#"]<[3" "]
[GREEN]( [c 4][4"[UPARROW]"] [4"[UPARROW
]"][6" "][c 2]][BLUE]%&%&&[GREEN][c *][R
VSON][6" "]";                               JK
•1360 PRINT"[RVSOFF][11" "]([13" "]([c 2]
][BLUE]&&%%&%&%&%&%&";                      CF
•1370 PRINT"[9" "][c 2]<>[3" "][GREEN]([3
" "]([4" "]( [c 2]][BLUE]&%[c 4]<<>[BLUE
]&%&%&[c 4]<<> ";                           CC
•1380 PRINT" [c 2]<>  [YELLOW]?  [c 2]<
> [GREEN](   ([6" "][c 2]][GREEN]([BLUE]&
%[c 4]<[UPARROW]><[BACKARROW]<<><[UPARRO
W]><[BACKARROW]";                           MM
•1390 PRINT"[c 2]<  ><=>< <> >[5" "][GREE
N]([3" "]([BLUE]&&%%[c 4]+[c 5]#[c 4]+ <
[BLUE]@[c 4]><+[c 5]#[c 4]+ [BACKARROW]"
;                                           EI
•1400 PRINT" [c 2]<><[3" "]><  ><><>[6"/"
][BLUE]&&[3"%"][c 4][3"+"] [3"+"] [3"+"]
 [BACKARROW]";                              CI
•1410 PRINT"[c 2]<>< [c 4]-[PURPLE]@[c 4]
- [c 2]><><  ><>[GREEN]]/]//[BLUE][4"%"]
&[c 4]+[c 5]#[c 4][3"+"][c 5]#[c 4][3"+"
][c 5]#[c 4]+ [BACKARROW]";                 JJ
•1420 PRINT"[GREEN](([c 2]>[GREEN]([c 4]-
[BLACK]7[c 4]-[GREEN]([c 2]<[GREEN]([c 4
]][c 2]>[GREEN](([c 2]<[GREEN](([c 2]>[c
 4]]//[BLUE]&%&[3"%"][c 4][3"+"][c 5]#[c
 4][3"+"][c 5]#[c 4][3"+"] [BACKARROW]"; BF
•1430 PRINT"]][GREEN][3"("][3"/"][CYAN]][
c 4]][GREEN]([c 4]][GREEN]][c 4]][GREEN]
(/[c 4]][GREEN]]//[BLUE]%&&[3"%"]&[c 4]+
[c 5]#[c 4]++[PURPLE]$[BLACK]8[PURPLE]$[
c 4]++[c 5]#[c 4]+<"                        NF
•1440 PRINT"[CYAN]][GREEN](([c 4]][15"/"]
[BLUE]%&[4"%"][c 2][PI][12":"]>[HOME]";     EB
•1450 RETURN                                DN
•1460 REM REDEFINED CHARACTERS              JP
•1470 BANK15:SUM=0:FORI=2816TO2869:READJ:
SUM=SUM+J:POKEI,J:NEXT:IFSUM<>7491THENPR
INT"ERROR!":END:ELSESYS2816:POKE2604,PEE
K(2604)AND240OR8:RESTORE1600                LM
•1480 READA:IFA=-1THENRESTORE1600:GOTO149
0:ELSEFORI=.TO7:READB:POKE8192+A*8+I,B:N
EXT:GOTO1480                                CE
•1490 READA:IFA=-1THEN1500:ELSEFORI=.TO7:
READB:POKE10240+A*8+I,B:NEXT:GOTO1490       KL
•1500 FORI=1TO6:READA:FORJ=.TO7:POKE10240
+A*8+J,PEEK(8192+A*8+J):NEXTJ,I             AP
•1510 FORI=.TO7:POKE10240+63*8+I,PEEK(819
2+63*8+7-I):NEXT                            DC
•1520 FORI=.TO7:POKE10240+37*8+I,PEEK(819
2+38*8+I):POKE10240+38*8+I,PEEK(8192+37*
8+I):NEXT:POKE10240+28*8+1,192:POKE10240
+28*8+2,252:RETURN                          PD
•1530 DATA 169,,133,250,133,252,169,208    JM
•1540 DATA 133,251,169,32,133,253,169,252  LM
•1550 DATA 141,185,2,169,16,141,54,11      GM
•1560 DATA 160,,169,250,162,14,32,116      MH
•1570 DATA 255,162,,32,119,255,200,208     ON
•1580 DATA 241,206,54,11,240,7,230,251     CG
•1590 DATA 230,253,76,26,11,96             KN
•1600 DATA0,255,129,189,195,195,189,129,2
```

```
55                                             FF
•1610 DATA27,,56,108,130,238,238,254,254  JL
•1620 DATA28,128,200,248,240,128,128,128,
 128                                           PN
•1630 DATA29,192,38,148,88,58,29,120,152  FG
•1640 DATA30,255,,,,,,,.                  IJ
•1650 DATA31,128,128,128,128,128,128,128,
 128                                           EK
•1660 DATA35,36,255,36,36,36,36,255,36    PF
•1670 DATA36,,60,126,66,124,126,66,126    NG
•1680 DATA37,2,132,127,2,20,168,71,136    HO
•1690 DATA38,49,74,132,250,129,80,40,199  CP
•1700 DATA39,,,24,18,28,153,255,126       BG
•1710 DATA40,8,62,93,8,127,62,73,28       PF
•1720 DATA41,24,50,55,125,188,162,34,68   DA
•1730 DATA42,24,24,60,90,153,36,66,195    KF
•1740 DATA43,2,255,32,255,2,255,32,255    EM
•1750 DATA45,170,85,170,85,170,85,170,85  CP
•1760 DATA47,36,,16,68,,16,130,16         IN
•1770 DATA58,255,2,255,8,255,32,255,128   DO
•1780 DATA59,,,,,,,,255                   PD
•1790 DATA60,1,2,4,8,16,32,64,128         OO
•1800 DATA61,17,170,68,16,132,,34,16      AD
•1810 DATA62,128,64,32,16,8,4,2,1         OD
•1820 DATA63,36,,16,68,,16,130,16         IC
•1830 DATA94,1,2,4,8,16,32,64,128         DA
•1840 DATA102,126,000,000,249,249,000,000
 ,126,-1                                       ME
•1850 REM COPY CHARACTERS TO LOWERCASE    MD
•1860 DATA 233,105,223,95,105,206         GK
•1870 REM X & Y DELTA VECTORS             FE
•1880 DATA 0,-1,1,-1,1,0,1,1,0,1,-1,1,-1,
 0,-1,-1                                       GM
•1890 REM LOCATIONS                       KK
•1900 DATA "[s C]LERIC'S [s T]EMPLE:[s M]
 ONASTERY","[s M]ONK'S [s S]TOREHOUSE:[s
 M]ONASTERY","[s C]ASTLE [s G]OHOLLA","[s
  M]ERLIN'S [s K]EEP","[s W]ARLORD'S [s H
 ]OLD","[s Z]OMBIE [s T]OWER","[s M]OUNTA
 INS OF [s F]IRE"                              MC
•1910 DATA "[s K]INGDOM OF THE [s O]RCS"  GE
•1920 REM TRADING COMMENTS                KI
•1930 DATA "[s G]ET THEE HENCE,FOOL!","[s
  S]O BE IT.","[s W]ELL IT IS.","[s W]ELL
  AND GOOD.","[s F]INE,THO[3"."]","[s T]H
 OU ART A SHREWD ROGUE.","[s Y]EA GODS!",
 "[s A] POX ON THEE!","[s C]URSE THOU!"        EF
•1940 REM TRADE COMMERCE                  MF
•1950 DATA "[s A]RTIFACTS","[s W]EAPONS",
 "[s A]RMOR","[s R]ARE [s M]ETALS","[s H]
 ORSES","[s S]LAVES","[s F]OOD [s P]RODUC
 TS","[s F]ABRICS","[s L]AND [s S]HARES"       CM
•1960 REM TRADERS                         EM
•1970 DATA "[s C]LERIC","[s M]ONK","[s E]
 MPEROR [s G]OHOLLA","[s M]ERLIN","[s W]A
 RLORD [s A]KUZA","[s Z]OMBIE [s M]ASTER"
 ,"[s D]WARVE [s R]ULER","[s O]RC [s K]IN
 G"                                            NF
•1980 REM DEMAND                          AG
•1990 DATA "[s N]O","[s N]EGLIGIBLE","[s
 S]LIGHT","[s L]OW","[s M]EDIOCRE","[s H]
 IGH","[s V]ERY HIGH","[s E]XTREME","[s I
 ]NCREDIBLE"                                   BH
•2000 REM CHOICES                         FL
•2010 DATA "[s B]UY","[s S]ELL","[s S]EAS
 ONAL [s C]HANGES","[s I]NQUIRE","[s I]NV
 ENTORY","[s B]ID [s F]AREWELL"                CB
•2020 REM BARGAINING COMMENTS             ML
•2030 DATA "[s I] LET THEM GO AT ","[s I]
  GIVE THEM AWAY AT ","[s I] TAKE OFF YOU
 R HANDS AT ","[s I] CONSENT TO GRANT YOU
  "                                            LK
•2040 REM SEASONS                         LB
•2050 DATA "[s S]PRING ","[s S]UMMER ","[
 s F]ALL[3" "]","[s W]INTER "                  EK
•2060 REM SEASON ADVANTAGES               GC
•2070 DATA "[s L]OSS!","[s N]O [s C]HANGE
 .","[s G]AIN!"                                OO
•2080 REM SPECIALIZED PRODUCTS            DN
•2090 DATA 7,400,6,250,4,840,0,220,1,325,
 5,500,3,900,2,475                             OL
•2100 REM AVERAGE PRICING RANGES          JO
•2110 DATA 50,75,75,500,100,150,60,40,400 FH
•2120 REM SPRING CHANGES                  IL
•2130 DATA -20,-25,-25,-100,+100,+200,+25
 ,-25,+125                                     JF
•2140 REM SUMMER CHANGES                  OP
•2150 DATA +10,.,.,.,.,+50,+50,-20,-30,-50 FM
•2160 REM FALL CHANGES                    AO
•2170 DATA +50,+25,+25,+75,.,.,.,-50,.,.. IN
•2180 REM WINTER CHANGES                  BN
•2190 DATA +100,+100,+100,-50,+300,-100,+
 200,+200,-150                                 ID
•2200 REM LAND OWNERSHIP PER KINGDOM      BO
•2210 REM IN FURLONGS                     DJ
•2220 DATA 75,175,400,250,125,325,800,550 BM
•2230 REM SEASONAL COLOR CHANGES          PD
•2240 DATA 6,8,9,2                        KH
•2250 COLOR4,14:COLOR.,12:COLOR5,14:PRINT
 "[HOME][HOME][CLEAR]":POKE2604,22:GRAPHI
 C CLR:PRINTCHR$(12)CHR$(142):END              PE
```

HOTFOOT
FROM PAGE 38

Starting address in hex: C000
Ending address in hex: C8DF
SYS to start: 49152

Flankspeed **required for entry! See page 95.**

```
C000: 20 18 E5 A9 8E 20 D2 FF 49
C008: A9 08 20 D2 FF A2 00 A9 F8
C010: 20 9D 00 88 9D 00 89 9D 1B
C018: 00 8A 9D 00 8B E8 D0 F1 77
C020: A2 00 A9 01 9D 00 D8 9D 81
C028: 00 D9 9D 00 DA 9D 00 DB F3
```

```
C030: E8 D0 F1 A9 00 8D 20 D0 04
C038: A9 00 8D 21 D0 AD 1E D0 FD
C040: AD 1F D0 A2 00 A9 00 9D C7
C048: 00 D4 E8 E0 19 D0 F8 A9 73
C050: 8F 8D 18 D4 A9 FF 8D 0E 9F
C058: D4 8D 0F D4 A9 81 8D 12 69
C060: D4 A9 84 85 FD A9 DB 85 F1
C068: FE A9 00 8D 86 C7 A9 01 97
C070: 8D 63 C7 A9 30 8D 69 C7 C1
C078: 8D 6B C7 A9 37 8D 6A C7 D9
C080: A9 95 8D 00 DD A9 20 8D 82
C088: 18 D0 A9 88 8D 88 02 A9 65
C090: 7F 8D 0D DC A9 33 85 01 EA
C098: A2 00 BD 00 D0 9D 00 80 E7
C0A0: BD 00 D1 9D 00 81 BD 00 0D
C0A8: D2 9D 00 82 BD 00 D3 9D CA
C0B0: 00 83 BD 00 D4 9D 00 84 E8
C0B8: BD 00 D5 9D 00 85 BD 00 2D
C0C0: D6 9D 00 86 BD 00 D7 9D EE
C0C8: 00 87 E8 D0 CD A9 37 85 3E
C0D0: 01 A9 81 8D 0D DC A2 00 17
C0D8: BD 7A C6 9D 80 81 E8 E0 41
C0E0: 50 D0 F5 A2 00 BD 87 C7 A7
C0E8: 9D 00 88 9D 78 88 9D F0 3C
C0F0: 88 9D 68 89 9D E0 89 9D AE
C0F8: 58 8A 9D D0 8A 9D 48 8B 46
C100: E8 E0 78 D0 E0 20 5C C3 34
C108: A2 00 BD 03 C8 9D 47 88 A1
C110: E8 E0 04 D0 F5 A2 00 BD 05
C118: FF C7 9D 6F 88 E8 E0 04 43
C120: D0 F5 A9 30 8D 97 88 8D FB
C128: 99 88 A9 37 8D 98 88 A9 83
C130: 08 8D 2C 88 8D 2C D8 A9 B6
C138: 0E 8D 74 DB A9 03 8D 74 D2
C140: 8B A9 54 85 8B A9 88 85 92
C148: 8C A2 00 A0 00 A9 A0 91 F3
C150: 8B 18 A5 8B 69 28 85 8B C7
C158: A5 8C 69 00 85 8C E8 E0 CF
C160: 13 D0 EA A9 E4 8D 4C 8B 23
C168: A2 00 BD 07 C8 9D 37 89 F6
C170: E8 E0 05 D0 F5 A9 30 8D 6D
C178: 5F 89 8D 60 89 8D 61 89 51
C180: 8D 62 89 A2 00 BD CA C6 EB
C188: 9D 00 8C E8 E0 80 D0 F5 C3
C190: A9 30 8D F8 8B A9 31 8D E4
C198: F9 8B A9 00 8D 10 D0 A9 DF
C1A0: 00 8D 1D D0 A9 00 8D 17 6A
C1A8: D0 A9 00 8D 1B D0 A9 00 46
C1B0: 8D 1C D0 A9 0A 8D 27 D0 64
C1B8: A9 02 8D 28 D0 A2 AC A0 DA
C1C0: DC 8E 00 D0 8C 01 D0 A2 FD
C1C8: 33 A0 DE 8E 02 D0 8C 03 6C
C1D0: D0 A9 03 8D 15 D0 A9 7C E7
C1D8: A2 C2 8D 18 03 8E 19 03 91
C1E0: A9 7F 8D 0D DD A9 82 8D 3C
C1E8: 0D DD A9 63 A2 02 8D 04 17
C1F0: DD 8E 05 DD A9 11 8D 0E 96
C1F8: DD A9 00 A2 0B 8D 06 DD 9F
C200: 8E 07 DD A9 51 8D 0F DD E8
C208: AD 86 C7 F0 03 4C 76 C5 80
C210: A5 91 C9 7F D0 0D A9 7F 97
C218: 8D 0D DD A9 04 8D 88 02 56
C220: 4C 66 FE AD 00 DC 29 1F A4
C228: C9 1F F0 DC C9 1E D0 06 9D
C230: 20 8A C2 4C 08 C2 C9 1D 9B
C238: D0 06 20 DF C2 4C 08 C2 E8
C240: C9 17 D0 06 20 FC C2 4C 24
C248: 08 C2 C9 1B D0 06 20 16 05
C250: C3 4C 08 C2 C9 16 D0 06 E1
C258: 20 FC C2 4C 08 C2 C9 15 2E
C260: D0 06 20 FC C2 4C 08 C2 2E
C268: C9 1A D0 06 20 16 C3 4C 69
C270: 08 C2 C9 19 D0 03 20 16 28
C278: C3 4C 08 C2 48 8A 48 98 07
C280: 48 20 5C C3 20 82 C4 4C BC
C288: 51 FE AD 01 D0 C9 34 F0 47
C290: 4D 38 E9 18 8D 01 D0 20 97
C298: 66 C4 20 82 C4 20 A9 C5 BA
C2A0: EE 63 C7 AD 63 C7 C9 08 65
C2A8: D0 31 A9 7F 8D 0D DD 20 6C
C2B0: FB C4 20 11 C5 AD 97 88 36
C2B8: C9 30 D0 14 AD 98 88 C9 30
C2C0: 30 D0 0D AD 99 88 C9 30 98
C2C8: D0 06 20 54 C5 20 27 C5 E6
C2D0: 20 BA C4 A9 82 8D 0D DD 15
C2D8: 4C DE C2 20 E6 C4 60 AD A0
C2E0: 01 D0 C9 DC F0 15 18 69 E0
C2E8: 18 8D 01 D0 20 74 C4 20 D9
C2F0: 82 C4 20 A9 C5 CE 63 C7 C1
C2F8: 20 E6 C4 60 AD 00 D0 C9 6D
C300: EC F0 12 18 69 20 8D 00 1F
C308: D0 20 4A C4 20 82 C4 20 8F
C310: A9 C5 20 E6 C4 60 AD 00 59
C318: D0 C9 6C F0 12 38 E9 20 64
C320: 8D 00 D0 20 58 C4 20 A9 85
C328: C5 20 82 C4 20 E6 C4 60 81
C330: A2 00 AD 1B D4 29 03 F0 8D
C338: F9 C9 01 D0 08 A9 02 9D 1F
C340: 5E C7 4C 56 C3 C9 02 D0 69
C348: 08 A9 07 9D 5E C7 4C 56 67
C350: C3 A9 01 9D 5E C7 E8 E0 4C
C358: 05 D0 D7 60 A9 0A 85 8B 2B
C360: A9 D8 85 8C A9 00 8D 64 90
C368: C7 A9 00 8D 65 C7 20 30 E4
C370: C3 A2 00 A0 00 BD 5E C7 5B
C378: 91 8B C8 91 8B C8 91 8B 61
C380: C8 91 8B C8 E8 E0 05 D0 CE
C388: EC 18 A5 8B 69 28 85 8B 61
C390: A5 8C 69 00 85 8C EE 65 92
C398: C7 AD 65 C7 C9 03 D0 D1 AA
C3A0: EE 64 C7 AD 64 C7 C9 08 67
C3A8: D0 BF 60 8A 48 18 AD 01 33
C3B0: D0 69 08 8D 01 D0 A0 00 F2
C3B8: B9 A2 8B 99 6C C7 B9 A2 CA
C3C0: DB 99 4A C7 C8 C0 14 D0 B6
C3C8: EF A9 7A 85 8B A9 8B 85 A8
```

```
C3D0: 8C A9 A2 85 8D A9 8B 85 77
C3D8: 8E AD 11 D0 10 FB A2 00 A5
C3E0: A0 00 20 3A C4 B1 8B 91 6F
C3E8: 8D A5 8C 09 50 85 8C A5 B9
C3F0: 8E 09 50 85 8E B1 8B 91 BB
C3F8: 8D A5 8C 29 AF 85 8C A5 49
C400: 8E 29 AF 85 8E C8 C0 14 19
C408: D0 DB A5 8B 85 8D A5 8C 2B
C410: 85 8E 38 A5 8B E9 28 85 25
C418: 8B A5 8C E9 00 85 8C E8 BA
C420: E0 17 D0 BC A0 00 B9 6C 6C
C428: C7 99 0A 88 B9 4A C7 99 81
C430: 0A D8 C8 C0 14 D0 EF 68 D9
C438: AA 60 48 A9 32 8D 84 C7 41
C440: CE 84 C7 AD 84 C7 D0 F8 1F
C448: 68 60 18 A5 FD 69 04 85 BF
C450: FD A5 FE 69 00 85 FE 60 41
C458: 38 A5 FD E9 04 85 FD A5 4B
C460: FE E9 00 85 FE 60 38 A5 0C
C468: FD E9 78 85 FD A5 FE E9 DA
C470: 00 85 FE 60 18 A5 FD 69 7A
C478: 78 85 FD A5 FE 69 00 85 08
C480: FE 60 A0 00 B1 FD 29 0F 68
C488: C9 01 F0 2D C9 07 D0 06 19
C490: CE 03 D0 4C A8 C4 CE 03 BE
C498: D0 CE 03 D0 CE 03 D0 CE 7D
C4A0: 03 D0 CE 03 D0 CE 03 D0 B9
C4A8: AD 03 D0 C9 43 B0 0A A9 9B
C4B0: 01 8D 86 C7 A9 42 8D 03 0A
C4B8: D0 60 A2 00 20 AB C3 E8 05
C4C0: E0 15 D0 F8 A9 01 8D 63 1C
C4C8: C7 18 A5 FD 69 48 85 FD 81
C4D0: A5 FE 69 03 85 FE A9 00 10
C4D8: 8D 06 DD A9 0B 8D 07 DD 71
C4E0: A9 51 8D 0F DD 60 48 8A 89
C4E8: 48 98 48 A0 AA A2 FF CA CA
C4F0: D0 FD 88 D0 F8 68 A8 68 8B
C4F8: AA 68 60 A2 03 18 BD 5F 47
C500: 89 7D 80 C7 C9 3A 90 02 E5
C508: E9 0A 9D 5F 89 CA 10 EE 4C
C510: 60 A2 02 38 BD 97 88 FD 29
C518: 66 C7 C9 30 B0 02 69 0A 66
C520: 9D 97 88 CA 10 EE 60 A2 AA
C528: 02 18 BD 69 C7 7D 66 C7 DC
C530: C9 3A 90 02 E9 0A 9D 69 C1
C538: C7 CA 10 EE AD 69 C7 8D 36
C540: 97 88 AD 6A C7 8D 98 88 EE
C548: AD 6B C7 8D 99 88 A9 DE 61
C550: 8D 03 D0 60 18 A2 0E A0 7B
C558: 1F 20 F0 FF A2 00 BD 0C F4
C560: C8 F0 07 20 D2 FF E8 4C 49
C568: 5E C5 20 FE C5 20 31 C6 89
C570: A9 00 8D 86 C7 60 A9 7F 7F
C578: 8D 0D DD 20 BE C5 18 A2 50
C580: 0E A0 1F 20 F0 FF A2 00 02
C588: BD 77 C8 F0 07 20 D2 FF 71
C590: E8 4C 88 C5 A5 91 C9 7F 94
C598: D0 03 4C 16 C2 AD 00 DC 1C
C5A0: 29 1F C9 0F D0 EE 4C 0D DA
C5A8: C0 A9 4F 8D 01 D4 A9 07 76
C5B0: 8D 05 D4 A9 80 8D 04 D4 A8
C5B8: A9 81 8D 04 D4 60 A9 10 64
C5C0: 8D 0B D4 A9 F0 8D 0D D4 38
C5C8: A9 11 8D 0B D4 A9 3C 8D 64
C5D0: 85 C7 EE 85 C7 AD 85 C7 55
C5D8: C9 FF F0 0B 8D 08 D4 A2 AB
C5E0: 05 20 59 C6 4C D2 C5 38 43
C5E8: A9 F0 E9 10 A2 64 20 59 FD
C5F0: C6 8D 0D D4 85 02 A5 02 56
C5F8: F0 03 4C EA C5 60 A9 00 F3
C600: 8D 85 C7 A9 12 8D 0B D4 04
C608: A9 28 8D 0C D4 A9 4F 8D CE
C610: 08 D4 A9 50 8D 01 D4 A9 F3
C618: 13 8D 0B D4 A2 C8 20 59 7D
C620: C6 A9 12 8D 0B D4 EE 85 84
C628: C7 AD 85 C7 C9 0F D0 E7 7C
C630: 60 A2 00 A9 4F 85 8B A9 E6
C638: 8A 85 8C A9 20 A0 00 91 D0
C640: 8B C8 C0 09 D0 F9 18 A5 E6
C648: 8B 69 28 85 8B A5 8C 69 12
C650: 00 85 8C E8 E0 09 D0 E3 E9
C658: 60 A0 FF 88 D0 FD CA D0 4C
C660: F8 60 48 4F 54 46 4F 4F 8A
C668: 54 20 4A 4F 48 4E 20 4B 78
C670: 52 55 54 43 48 20 31 39 82
C678: 38 37 3C 66 66 66 66 66 24
C680: 66 3C 18 38 78 18 18 18 34
C688: 18 18 3C 66 06 0C 30 60 FD
C690: 60 7E 3C 66 06 0C 06 06 30
C698: 66 3C 66 66 66 66 7F 06 5A
C6A0: 06 06 7E 60 60 7C 06 06 74
C6A8: 66 3C 3C 66 60 7C 66 66 97
C6B0: 66 3C 7E 66 0C 18 18 18 8C
C6B8: 18 18 3C 66 66 3C 66 66 FA
C6C0: 66 3C 3C 66 66 3E 06 06 B6
C6C8: 66 3C 19 B0 00 3D B6 00 29
C6D0: 3F F6 C0 1F FE C0 1F FF C5
C6D8: C0 1F FF 80 0F FF 80 07 CF
C6E0: FF 80 03 FF 80 03 FF 80 68
C6E8: 01 FF 80 01 FF 80 01 FF EC
C6F0: 80 00 FF 80 00 FF 80 00 72
C6F8: FF 80 00 7F 00 00 3E 00 37
C700: 00 00 00 00 00 00 00 00 00
C708: 00 00 07 FC 00 07 FC 00 10
C710: 07 FC 00 00 00 00 00 00 14
C718: 00 00 00 00 00 00 00 00 18
C720: 00 00 00 00 00 00 00 00 20
C728: 00 00 00 00 00 00 00 00 28
C730: 00 00 00 00 00 00 00 00 30
C738: 00 00 00 00 00 00 00 00 38
C740: 00 00 00 00 00 00 00 00 40
C748: 00 00 00 00 00 00 00 00 48
C750: 00 00 00 00 00 00 00 00 50
C758: 00 00 00 00 00 00 00 00 58
C760: 00 00 00 01 00 00 00 00 61
C768: 07 30 37 30 00 00 00 00 07
```

```
C770: 00 00 00 00 00 00 00 00 70
C778: 00 00 00 00 00 00 00 00 78
C780: 00 00 00 07 00 00 00 20 A7
C788: 20 20 20 20 20 20 20 20 89
C790: 20 A0 A0 A0 EA A0 A0 A0 5F
C798: EA A0 A0 A0 EA A0 A0 A0 32
C7A0: EA A0 A0 A0 EA 20 20 20 B8
C7A8: 20 20 20 20 20 20 20 20 A9
C7B0: 20 20 20 20 20 20 20 20 B1
C7B8: 20 A0 A0 A0 EA A0 A0 A0 87
C7C0: EA A0 A0 A0 EA A0 A0 A0 5A
C7C8: EA A0 A0 A0 EA 20 20 20 E0
C7D0: 20 20 20 20 20 20 20 20 D1
C7D8: 20 20 20 20 20 20 20 20 D9
C7E0: 20 EF EF EF FA EF EF EF 9B
C7E8: FA EF EF EF FA EF EF EF 7E
C7F0: FA EF EF EF FA 20 20 20 17
C7F8: 20 20 20 20 20 20 20 0C E5
C800: 05 06 14 12 0F 17 13 13 7D
C808: 03 0F 12 05 9A 59 4F 55 C9
C810: 20 48 41 56 45 11 9D 9D A1
C818: 9D 9D 9D 9D 9D 9D 41 47 52
C820: 49 4C 45 11 9D 9D 9D 9D 82
C828: 9D 46 45 45 54 21 20 4E 7A
C830: 4F 57 11 9D 9D 9D 9D 9D FB
C838: 9D 9D 9D 9D 54 52 59 20 CE
C840: 49 54 11 9D 9D 9D 9D 9D 03
C848: 9D 41 47 41 49 4E 11 9D F5
C850: 9D 9D 9D 9D 57 49 54 48 04
C858: 11 9D 9D 9D 9D 53 45 56 CE
C860: 45 4E 11 9D 9D 9D 9D 9D 19
C868: 4D 4F 52 45 11 9D 9D 9D 86
C870: 9D 52 4F 57 53 2E 00 81 0A
C878: 53 4F 52 52 59 11 9D 9D 65
C880: 9D 9D 9D 41 42 4F 55 54 D5
C888: 11 9D 9D 9D 9D 9D 59 4F 56
C890: 55 52 11 9D 9D 9D 9D 42 02
C898: 55 52 4E 45 44 11 9D 9D 64
C8A0: 9D 9D 9D 9D 46 4F 4F 54 50
C8A8: 2E 11 9D 9D 9D 9D 9D 50 4C
C8B0: 52 45 53 53 11 9D 9D 9D D8
C8B8: 9D 9D 42 55 54 54 4F 4E D1
C8C0: 11 9D 9D 9D 9D 9D 9D 54 D7
C8C8: 4F 20 50 4C 41 59 11 9D 1E
C8D0: 9D 9D 9D 9D 9D 9D 41 47 0B
C8D8: 41 49 4E 2E 00 00 00 00 DF
```

AMIGA SECTION

Continued from page 61

Finally, after a specified time limit—or after two inactive minutes—*Diga!* Remote will log off the caller. It's not quite the "Revenge of the Amiga AnswerMate" but it comes pretty close.

One final feature of *Diga!* that deserves mention is its handling of the capture buffer. *Diga!'s* buffer is selectable not only in size (the default is 16K and can go up to 512K) but also in type of buffer. Aside from the normal "once it's full, it's full" mode, *Diga!* also supports a special Loop mode that replaces the oldest text with the newest. A View Buffer window can be opened for you to scroll back and forth through your captured text. The Buffer can also interchange text with Amiga's clipboard in either IFF text format or the popular TxEd format. And for those times when you scream, "Oh, why oh why didn't I have my buffer open?" the buffer on-off switch can be set and saved as part of your opening configuration file.

As usual, one is never satisfied. One area that was overlooked in *Diga!'s* development is in the chatting or conferencing abilities. Several telecommunication programs have the capacity to open a "Chat Window" so that you can safely compose your words of wisdom, not to mention your snappy comebacks,



apart from the incoming text during conferencing. This feature is sorely missed and was possibly omitted because a majority of the development work on *Diga!* was performed on Bix, which has no real conferencing area. Whatever the reason, it is a must for *Diga!* 2.0.

There do seem to be a number of minor, and one not so minor, bugs associated with *Diga!* I have had the machine lockup (a hard-core lockup without even a smiling Guru) while trying varying combinations in the Screen Requestor. Other people have reported several other "quirky" bugs—ones that don't seem to be in the major flow of the program but rather stem from the many options one is presented with. However, my major complaint with *Diga!'s* operating is its inability to release the serial port upon exiting the program. If you then restart the program, you will receive a System Requestor that states the *Diga!* can't get the serial port. Very messy cleanup.

Unfortunately, I do have one more gripe—and it's a big one. I really find the documentation to be extremely lacking. Undocumented features are the rule here—which I suppose is better than having no features—and it is extremely frustrating. I wonder how many *Diga!* owners reading this review know that clicking on the word "Configuration" or "Script" in the Phonebook requestor would generate file requestors? Moreover, not enough detail is devoted to the more unique features of *Diga!* such as Doubletalk and Remote Access. No clue is given as to when you are to invoke DoubleTalk when receiving a call; DoubleTalk cannot autoanswer, but there's no way to know it without finding out rather rudely. Add to these specific complaints the lack of an index and you're doing a serious disservice to a great program. *Diga!* deserves better.

Happily though, the strengths of *Diga!* far outweigh its weaknesses and I can recommend this program to all levels of telecommunicators. From the first-timer who marvels when someone starts "typing" at him to the poweruser whose entire telecommunicating life is scripted, *Diga!* speaks, and powerfully.

Aegis Development, 2210 Wilshire Blvd. #576, Santa Monica, CA 90403.

—Joseph Lowery

TIPS AHOY!

Continued from page 52

```
62,5
80 DATA 160,0,173,18,208,201,10,176,4,162,146
90 DATA 160,1,140,32,208,142,18,208,173,13,220
100 DATA 41,1,240,3,76,49,234,76,188,254
```

COLOR KEY

Here is a unique way of defining a function key that changes the color of the border.

```
KEY1,CHR$(27)+"J[7 "[INSERT]"]COLOR4,"+CHR$(13)
```

After defining the function key, position the cursor at the beginning of a blank line. Now, type the number 1 and hit the previously defined function key. Your border should now be black. This technique can also be used to load or save a BASIC program on disk. For a loading example, define a key with the following function:

```
KEY1,CHR$(27)+"J[6 "[INSERT]"]DLOAD"+CHR$(34)+CHR$(13)
```

Again, position the cursor at the beginning of a blank line. Type the name of a file that you would like to load. When doing so, just type the filename and no quotation marks. Hit your previously defined function key and your BASIC program is loaded into memory. –Michael Jaecks
Alamogordo, NM

EPROM TESTER

As a computer technician, I have found that the most annoying part of EPROM (Erasable Programmable Read-Only Memory) programming is the time spent in verifying that the chips are empty after erasure. In the past, I have written short BASIC programs to handle this function, but the waiting involved in checking thousands of memory locations for proper erasure is frustrating and time-consuming using BASIC programming alone.

Now, both experimenters and professionals can benefit from *EPROM Tester.* By using a short machine language subroutine within a BASIC program, EPROM memories can be checked with split-second speed.

To use this program, LOAD your EPROM data directly into the Commodore 64 RAM (or C-128 in 64 mode) following the instructions provided by the manufacturer of your EPROM programmer. A restriction to this is that you should not load below address 3500 decimal. Then LOAD and RUN this program in the normal BASIC program area. You will be prompted to input a decimal start and ending location in RAM, which will be tested for proper erasure (255 decimal, or FF hex). Almost instantly, the results will be displayed on the screen. Locations not properly erased will be shown with an error message. The machine language portion is fully relocatable in case you need to move it elsewhere in memory.

I hope you will enjoy using this program as much as I do when working with EPROMs. –David S. Krause
Grissom AFB, IN

```
10 REM EPROM TESTER
20 REM BY DAVID S. KRAUSE
30 FORX=3400TO3450:READY:POKEX,Y:NEXT:PRINT"[CLEAR]"
40 PRINT"[DOWN][DOWN](LOAD EPROM AT OR ABOVE 3500 DECIMAL)"
50 INPUT"[DOWN][DOWN]EPROM START ADDRESS ";S$
60 INPUT"[DOWN][DOWN]EPROM ENDING ADDRESS";E$
70 S=VAL(S$):E=VAL(E$):A=INT(S/256):B=(S/256-A)*256
80 C=INT(E/256):D=(E/256-C)*256
90 IFS>ETHENPRINT"[DOWN][DOWN](ERROR-START CANNOT BE GREATER THAN END ADDRESS)":GOTO50
100 POKE251,B:POKE252,A:POKE253,D:POKE254,C
110 SYS3400
120 IFPEEK(2)=7THENPRINT"[CLEAR]SPECIFIED ADDRESSES ARE FULLY ERASED"
130 IFPEEK(2)=33THENPRINT"[CLEAR]ERROR IN ADDRESS";:PRINTPEEK(251)+256*PEEK(252)
140 END
150 DATA120,160,0,177,251,201,255,208,26
160 DATA165,252,197,254,208,12,165,251,197,253,208,6,169,7,133,2,88,96
170 DATA160,0,177,251,201,255,240,6,169,33,133,2,88,96,230,251,208,208,230
180 DATA252,208,204,88,96
```

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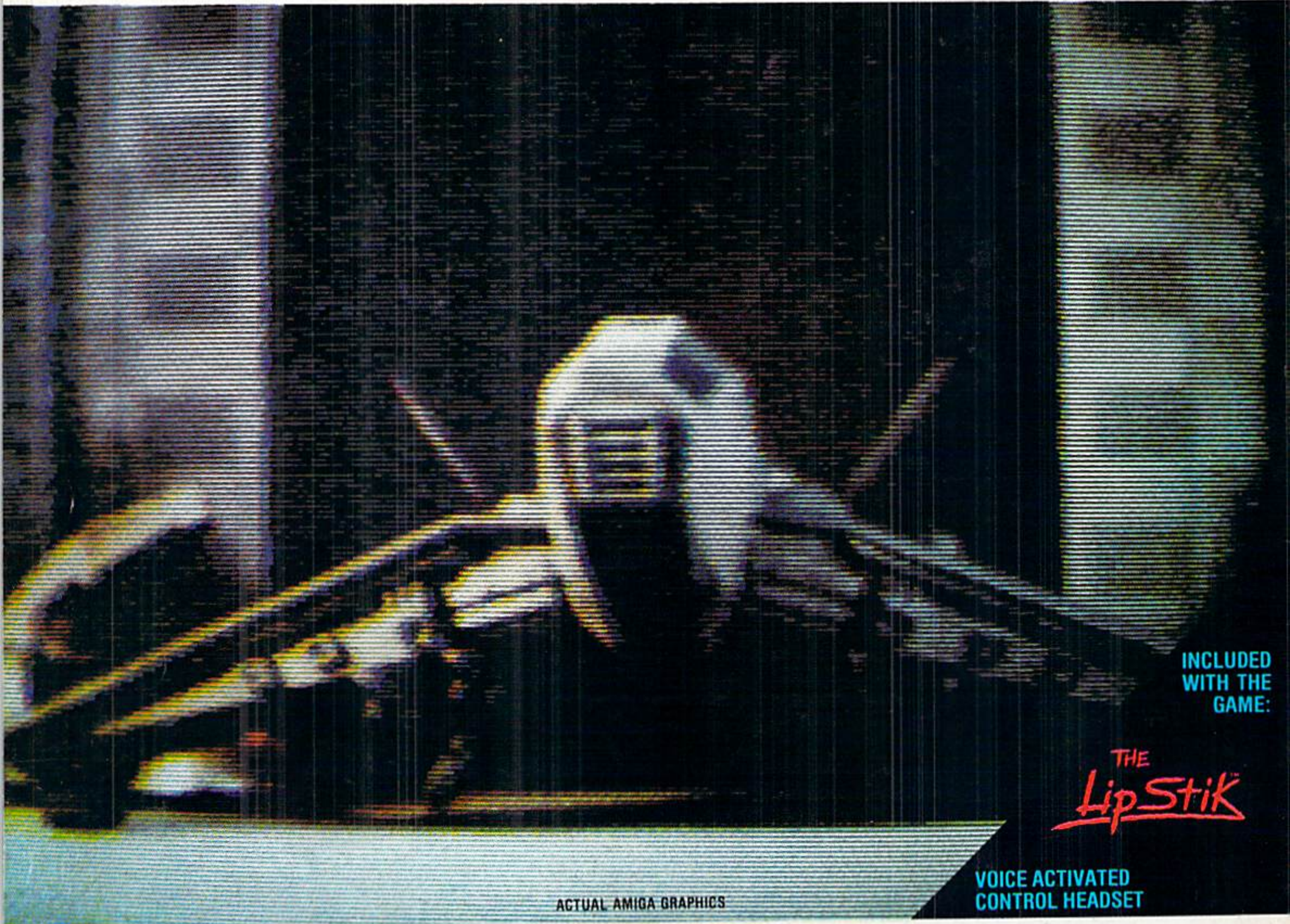
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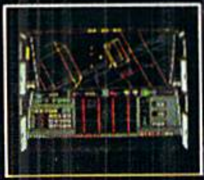


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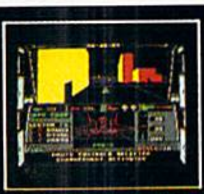
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